Niger: Investing in Human Capital, Agricultural Productivity, and Social Protection for faster Poverty Reduction

A POVERTY ASSESSMENT

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ACKNOWLEDGMENTS

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ABBREVIATIONS AND ACRONYMS

ACAPS	The Assessment Capacities Project
ACLED	Armed Conflict Location and Event Data
AEZ	Agro-Ecological Zone
AQUASTAT	FAO's Global Information System on Water and Agriculture
ASNP	Adaptive Safety Net Project
CCA	Cellule de Crise Alimentaire
CFS	Cellule Filets Sociaux
CFW	Cash for Work
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station data
CPF	Country Partnership Framework
CPI	Consumer Price Index
DHS	Demographic and Health Survey
DNPGCA	Dispositif National de Prévention et de Gestion des Crises Alimentaires
EHCVM	Enquête Harmonisée sur les Condition de Vie des Ménages
FAO	United Nations Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FCFA	Franc de la Communauté Financière Africaine
FEWSNET	Famine Early Warning Systems Network
FIES	Food Insecurity Experience Scale
FINDEX	Global Financial Inclusion Database
FLFP	Female Labor Force Participation
GDP	Gross Domestic Product
GPS	Global Positioning System
GYGA	Global Yield Gap Atlas
HA	Hectare
HCI	Human Capital Index
HEA	Household Economy Approach
HFPS	High Frequency Phone Survey
HI	Herfindahl Index
ICR	Implementation Completion Report
ICT	Information and Communications Technology
IFPRI	International Food Policy Research Institute
INS	Institut National de la Statistique

IPC	Integrated Phase Classification
KCAL	Kilocalorie
KM	Kilometer
LDF	Livestock-Derived Food
LSMS	Living Standards Measurement Study
MDGs	Millennium Development Goals
MPI	Multidimensional Poverty Index
MT	Metric Ton
NDVI	Normalized Difference Vegetation Index
NER	Niger
NFE	Non-Farm Enterprise
NSU	Non-Standard Units
OB	Oaxaca-Blinder
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OOP	Out-Of-Pocket
PEAMU	Projet Eau et Assainissement en Milieu Urbain
PER	Public Expenditure Review
PMT	Proxy Mean Test
PPP	Purchasing Power Parity
R&D	Research and Development
SCD	Systematic Country Diagnostic
SDGs	Sustainable Development Goals
SSA	Sub-Saharan African
SSAF	Sub-Saharan French-Speaking Africa countries
SU	Standard Units
SWEDD	Sahel Women's Empowerment and Demographic Dividend
UNECA	United Nations Economic Commission for Africa
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
USR	Unified Social Registry
WAEMU	West African Economic and Monetary Union
WDI	World Development Indicators
WFP	World Food Program

EXECUTIVE SUMMARY

This poverty assessment aims to strengthen the analytical foundation for poverty-reduction policies and interventions in Niger. With a Human Development Index of 0.394 in 2019, Niger is ranked at the bottom, 189 out of 189 countries and territories. The country is experiencing rapid population growth (estimated at about 3.8 percent per annum) driven by a high fertility (6.9 children per woman), the highest in the World. Over the past decade, economic growth averaged almost 6 percent (but only 1.6 percent in per capita terms). The country earns its foreign exchange mainly from uranium and gold, which has limited domestic economic linkages. Distant second, livestock export also provide important revenue to the country. Overall, most of the labor force is employed in a low productivity and shock prone rainfed agricultural sector. With poverty incidence at above 40 percent, almost 9 million Nigerien continue to live in poverty—of which almost half live in two regions: Zinder and Maradi. The COVID-19 pandemic growth slowdown is estimated to have pushed up to an additional 270,000 people into poverty. Niger is further beset by vast infrastructure gaps, intensifying terrorism attacks domestically, persisting conflict in the Sahel region, and intensifying environmental pressures. Robust poverty reduction and steady gains in shared prosperity will require investments to bolster human capital, interventions to increase agricultural productivity and develop the rural economy, and mitigate vulnerability to shocks both at the household and community levels. The effectiveness of these interventions will hinge on improved governance, successful conflict resolution, and enhanced security.

POVERTY IN NIGER

From 2015 onward, Niger experienced accelerating and agricultural sector driven economic growth. Following a deep contraction in 2015, Niger's average GDP growth was solid at nearly 6 percent per year and was relatively even across years. The agricultural sector which employs most of the poor has seen not only substantial growth during this period, but also higher growth than the industry, manufacture and services sectors. Growth in the agriculture sector averaged 7 percent per year. Growth in agriculture was mainly driven by good agro-climatic conditions and the expansion of cultivated land.

Between 2014 and 2019, there was a substantial reduction of poverty particularly in rural areas where most households earn their livelihood from agricultural sector. In the meantime, there was an increase in urban poverty. The strong macroeconomic performance translated into a substantial reduction of the proportion of the population living in poverty between 2014 and 2019. The proportion of the population living below the national poverty line declined by 5.4 percentage points, to 40.8 percent in 2019. However, because of the high population growth, the number of poor has increased from 8.6 million in 2014 to 9 million in 2019. Changes in the intensity and severity of poverty[1] follow similar patterns to those observed for the poverty headcount. Trend in poverty reduction was different across residence areas. Those living in rural areas have experienced a substantial improvement, with the proportion of rural population living below the national poverty line falling rapidly, by 6.9 percentage points to 46.8 percent in 2019. However, during the same period, urban poverty has increased by 3.8 percentage points, to 11.8 percent in 2019.

Poor households earn most of their income from agriculture and livestock, and consequently poverty continues to be a rural phenomenon in Niger. It is estimated that the country has 9 million poor inhabitants, among which over 95 percent reside in rural areas. Not only do rural inhabitants have higher risk of being poor, but they also fall deeper into poverty compared to their peers

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1   Also called poverty gap and squared poverty gap respectively.

in urban areas. The depth of poverty, which represents the average distance between the consumption per capita of the average poor and the poverty line is 13.0 percent in rural areas, against only 2.4 percent in urban areas. Income from agriculture and livestock represents more than half of the total income for rural households in the bottom 40 percent of the consumption distribution. For poor households, income from non-farm activities is smaller.

There are important disparities at the sub-national level: Dosso, Zinder, and Maradi are lagging regions. At 6.9 percent, the poverty rate is by far the lowest in Niamey. On the opposite, Dosso, Zinder, Maradi and Tillaberi regions have the highest poverty rates, estimated at 48.4%, 47.8%, 46.1%, and 42.3% respectively. Out of all 8 regions, Zinder and Maradi houses the largest poverty mass, or the number of the poor – nearly half of Nigerien poor live in these two regions alone. This compelling concentration of the number of poor in Zinder and Maradi is crucial for budget allocation across regions, and cost estimates of a social policy targeted the poor, such as social safety net programs. To target poverty, it is important to pay attention to two lagging regions: Zinder and Maradi.

Consumption growth favors the poorest, resulting in a reduction of inequalities. Between 2014 and 2019, growth in real consumption per capita was positive and higher for the bottom 70 percent of the welfare distribution. But this growth was negative for those at the top of the welfare distribution. Noticeably, gains were particularly pro-poor in rural areas. However, in urban areas, growth was not pro-poor, those at the bottom of the distribution had a zero or negative growth, and therefore did not benefitted from the economic growth. All this resulted in a reduction of inequality, the Gini index decreasing from 36.9% in 2014 to 35.0% in 2019.

Alongside the reduction in monetary poverty, the proportion of Nigerien living in multi-deprivation has declined. Designed to complement monetary measures, the multi-deprivation indicator takes into account access to health and education services, access to other basic services such as electricity, water, and sanitation, as well as housing conditions and asset ownership. The level of improvement across these non-monetary dimensions indicates more favorable conditions for households to avail themselves of economic opportunities and raise the quality of their living condition. Measured against this indicator, Niger has made significant progress. Between 2014 and

2019, the percentage of people living in multi-deprivation has dramatically dropped from 70 percent to 60 percent. During the same period, ownership of modern assets such as mobile phones and motorcycle has increased, especially mobile phone coverage among the poor. Alongside the expansion of mobile phone coverage, access to financial services, particularly mobile banking, has improved. However, financial savings and capacity to borrow have declined dramatically for all Nigeriens. the fact that poor households are less capable of saving and borrowing is a worrisome sign that they might be more vulnerable to short-run economic shock.

Gender inequality remains a serious development constraint in Niger, despite Government' efforts to address the issue. The probability of being enrolled in a school is higher for boys compared to girls with a bigger gap at the tertiary related age group. The incidence of child marriage continued to be among the highest in Sub Saharan Africa. Estimations from the EHCVM 2018/2019 data reveals that more than half of women got married at age of 18 or below. Child marriage contribute to maintain fertility rate at a high level. In addition, early marriage has negative consequence on girls' ability to achieve high level of education, and also limit girls' ability to participate to the labor market. In Niger, decision making within household is dominate by men. There is still huge gap in market production and income in agriculture, livestock, household enterprises, and wage employment between women and men.

CONSTRAINTS ON POVERTY REDUCTION

At the macroeconomic level, there is a strong correlation between economic growth and poverty reduction. Niger's growth elasticity of poverty is estimated at -1.8, indicating that a 1 percentage-point increase in GDP is associated with a 1.8 percentage-point decline in the poverty rate, this very close to the average growth elasticity of poverty in Sub-Saharan Africa (SSA). In addition, a pro-poor distribution of returns to growth has contributed to a reduction of inequality. In 2014-19, the average consumption growth was highest and positive among bottom 70 percent of households of the consumption distribution, resulting in a reduction of inequalities.

Given the strong poverty elasticity of growth and a pro-poor redistribution of growth, both economic growth and redistribution factors are keys drivers of poverty reduction in Niger. Between 2014 and 2019, consumption

growth reduced the poverty rate by 2.9 percentage points, and a pro-poor redistribution of growth decreased the poverty rate by 2.5 percentage points, and the interaction between growth and redistribution was negligeable, close to zero. Consequently, the national poverty rate declined by 5.4 percentage points over the period.

Redistribution and changes in returns to households' endowments contributes to most of the consumption growth between 2014 and 2019. Between 2014 and 2019, poverty declined by 5.4 percentage points, among which 2.9 percentage points come from growth and 2.5 percentage points from redistribution. In other words, redistribution and growth effects accounted each for about 50 percent of all poverty reduction in the past 5 years. However, redistribution favors rural households but not urban residents. Poverty declined by 6.9 percentage points in rural areas. Economic growth contributes to only 2.7 percentage points of this reduction, while redistribution accounts for the rest. However, during this same period, urban poverty increased by 3.8 percentage points. This increase is explained entirely by the negative redistribution. Between 2014 and 2019, most of the impact of welfare came from returns. In particular, the largest share of the improvement in consumption growth can be attributed to higher returns to labor of household members, returns to change in households' location, and returns to changes in asset ownership and access to basic services. Due to high population growth, demographic factors contributed negatively to poverty reduction.

Several factors attenuate the relationship between growth and poverty reduction in Niger. These include: (i) widespread exposure to multiple shocks, including the COVID-19 pandemic, (ii) the low productivity of the rural economy, (iii) low overall levels of human capital, and (iv) a deep and persistent gender gap.

Exposure to Multiple Shocks

The COVID-19 Pandemic

The COVID-19 crisis has reversed much of the progress in poverty reduction achieved in Niger in recent years. Between 2014 and 2019, the national poverty rate fell by 5.4 percentage points. However, because of the population growth, the number of poor increased during the same period by about 400,000 people. In 2020, a combination of emergency health measures, precautionary behaviors by firms and consumers, and slowing global economic activity resulted in job losses, declining labor income, rising prices, and diminished remittance inflows. As a result, it is estimated that in 2020, 270,000 Nigerien felt into poverty because of the COVID-19 pandemic. And by 2022, this number could reach one million. Meanwhile, school closures are expected to further weaken educational outcomes among the current generation of school-age children. The ongoing crisis is also increasing the intensity of poverty for many of the country's poorest households, and these losses, combined with the pandemic's direct impact on public health, are likely to be felt for decades to come.

The COVID-19 crisis has had an especially devastating impact on food security. Most household have experienced a reduction of their income. As a consequence, a standard copping mechanism was to reduce food consumption. In high-frequency surveys, at the start of the pandemic, a very high proportion of households were food insecure. Indeed, about six out of ten households was eating almost always the same thing, 57 percent of households worried about not having food and 55 percent about not having food. Food insecurity is more pronounced in rural areas compared to urban and has impacted poor households more than non-poor.

Exposure to Other Type of Shocks

Nigerien households are highly vulnerable to a wide range of shocks. The dependence of the rural population on rain-fed agriculture and pastoralism exposes a majority of the labor force to weather-related shocks and the long-term impact of climate change. Much of the country's manufacturing and services sectors also depend on agricultural output, intensifying macroeconomic vulnerability to droughts, floods, pests, crop and livestock disease, and conflict-induced disruptions in the rural economy. Over 40 percent of Nigerien households reported experiencing a shock, either covariate or idiosyncratic shocks, in the past 3 years. The most important shocks Nigerien households face are natural hazards, health shocks, high food prices, and insecurity. Increased violence in bordering regions with Chad, Mali and Nigeria, and intercommunal conflict have caused an unprecedented humanitarian crisis in the Niger along with higher levels of food insecurity and malnutrition. Given limited coverage of social protection, and limited penetration of insurance/financial services, to cope with shocks, the most commonly used strategy for Nigerien household is to rely on friends and family, sale of livestock,

and savings. multivariate regressions suggest that conflicts, draught and related health shocks are negatively correlated to household food consumption in rural areas.

The Low Productivity of the Rural Economy

There is lot of potential to increase rural income. The vast majority of the population resides in rural areas. Consequently, the agriculture sector, including farming and livestock, continues to be the largest employer. Millet and sorghum are the two main staple crops in Niger. Livestock plays a small role in income generation for rural households although it is relatively more important in the northeast part of the country. The fact that the country has one main harvest season, results in strong seasonality in rural labor demand, income, and prices. Agricultural income are constraints by low productivity due to limited access to inputs, including financial services. Commercialization is also very low. Most households failed to create surplus, and only produce for their own consumption. Opportunities to increase rural income are many: increasing productivity of existing crops, greater commercialization, diversification into animal products and new crops.

Low Overall Levels of Human Capital

According to the HCI, a child born in Niger today can expect to achieve just 32 percent of her lifetime productive potential, due to a combination of inadequate education access, poor health outcomes, and high mortality rates. The average child can expect to receive only five years of schooling. Some indicators of education attainment have improved, but others are still much lower than the average of the SSA region. The completion rates for primary and lower secondary school in 2018 were 20 percent and 19 percent respectively signaling that Niger will still need significant effort and investment to catch up with the regional average. Between 2014 and 2017, mortality rate for children under 5 declined significantly, from 99 children per 1,000 live births to 84 although it was still higher than the SSA average. Meanwhile, a decline in maternal mortality from 573 deaths per 100,000 births down to 509 signals an improvement in maternal health between 2014 and 2018. However, a reduction in contraceptive prevalence poses a challenge to the government efforts to control the already-high fertility rate. This reverse trend can adversely affect women's health as well as their opportunity to participate in the labor market. Niger has the highest fertility rates in the world, this together which social norms and poverty,

do affect set of keys health related indicators such as child and maternal mortality, nutrition, etc. As a result of limited access and quality of social services, Niger is still among the bottom in the Human Capital Index ranking. Niger ranks 155th out of 157 countries on the World Bank's Human Capital Index.

A Deep and Persistent Gender Gap

Gender inequality is a major cross-cutting challenge, despite Government' efforts to address the issue. Despite progress in recent years, Niger continues to experience high gender disparities in primary and secondary education. Niger ranks second lowest on net enrollment rate for secondary school and percentage of secondary and primary school students who are female. The incidence of child marriage continued to be among the highest in Sub Saharan Africa. The median age at first marriage for women aged 20 to 49 is estimated at 15.8. Child marriage contribute to maintain fertility rate at a high level. In addition, early marriage has negative consequence on girls' ability to achieve high level of education, and also limit girls' ability to participate to the labor market. In Niger, decision making within household is dominate by men.

Gender is a strong determinant of access to productive resources, both in terms of land size and livestock holdings. There is still huge gap in market production and income in agriculture, livestock, household enterprises, and wage employment between women and men. Female-headed households have smaller land and own less livestock. Enterprises owned by women show 61 percent lower profits than those owned by men. Gaps are also large for wage earners. The gender gap in earnings is estimated at 29 percent when comparing similar male and female workers. These gender-based differences in access to productive resources are reflected in the composition of income, as the share of agricultural income in total income for male-headed households is larger than that of female-headed households.

POLICY PRIORITIES

Going forward, for poverty reduction to happen in a sustainable way, the following actions should be considered to overcome some of the many challenges. This report has documented that Niger has experienced a substantial poverty reduction in recent years. However, poverty reduction was concentrated in rural areas. Based

on the set of constraints to poverty reduction identified in this report, and in order to end poverty and boost shared prosperity in a sustainable manners, policymakers and their partners may want of design and implement effective interventions to: (i) counter the impact of the COVID-19 crisis, (ii) develop human capital, (iii) improve productivity and commercialization in the rural economy, (iv) build resilience to shocks by expanding coverage and improve targeting of formal social safety nets programs, and (v) address gender inequality. Ensuring the success of these interventions will require steadily improving the quality of governance while achieving lasting peace and security.

Countering the Impact of the COVID-19 Crisis

The COVID-19 pandemic is exacerbating household- and community-level vulnerability, and its combined economic and public-health shock poses unique challenges for policymakers. The crisis is putting upward pressure on food and input prices, while illness, disrupted value chains, and the loss of wage employment are reducing income levels. Cash and in-kind transfers to affected households could provide immediate relief, but Niger's current safety-net programs are small and poorly targeted. In this context, policymakers must leverage the ongoing efforts of development partners to support the implementation of the national social protection strategy, extend the coverage of social protection mechanisms, and create the necessary fiscal space to finance cash and in-kind transfers, while also laying the foundation for the safe resumption of normal economic activity.

Investing in Human Capital

To accelerate human capital development, policymakers must simultaneously increase the quantity and quality of education and health services. The country needs to close education and health gaps in order to improve human capital. A population that is well educated and in good health will be more productive. Higher level of productivity linked to higher income level and better living conditions. Effective learning requires prepared students, effective teachers, adequate inputs, skilled management at the school level, and good governance across the educational system. Increasing access to preschool and expanding school feeding programs could yield especially large gains in child development at a relatively modest fiscal cost.

Improving Productivity and Commercialization in the Rural Economy

A pro-poor growth strategy must focus on expanding livelihood opportunities in areas where the poor live and work. In Niger, poverty is overwhelmingly concentrated in rural areas, and accelerating rural income growth will require enhancing the marginal productivity of the rural workforce. Policymakers can boost agricultural productivity by facilitating the use of fertilizer and other inputs, leveraging the country's water resources through expanded irrigation systems, promoting improved soil-conservation practices, and introducing new techniques to support integrated crop and livestock production. Commercialization is also limited as most farmers produce for their own consumption. Improvement of productivity, and a market-oriented agriculture will help boost rural income given available domestic and international markets. This will also require a shift to high value crop, further investment in research and development, and policies to encourage farmers to adopt new technologies. Insecurity is one of the most binding constraint to agricultural productivity. To enable farmers and entrepreneurs to invest in improving their long-term productivity, the government must consolidate the rule of law nationwide while building public institutions capable of protecting property rights and resolving disputes over access to land and other resources.

Building Resilience to Shocks

Nigerien households typically have few resources to draw on in the event of a shock, and they often deploy coping strategies that deplete their productive assets and human capital, diminishing their long-term productivity. Increasing household resilience will require developing adaptive social protection systems that can: (i) provide income support and information to build and protect human capital in the face of shocks and crises; (ii) facilitate access to critical education, health, and nutrition services; (iii) promote equality of opportunity; and (iv) support the development of workforce skills to increase and diversify labor income. Creating new delivery platforms could enable the authorities to implement a multisectoral approach to social protection.

Households across Niger face uninsured risks that prevent them from investing more in more profitable agricultural activities. Offering agricultural index insurance or index-based livestock insurance could enhance resilience among smallholder farmers and pastoralists. Agricultural index insurance links payouts to an average estimate of crop losses based on an index of factors, such as an area's average rainfall or vegetation growth rate, and similar indexes underpin index-based livestock insurance. Establishing agricultural index insurance in the cash-crop-and-cereal livelihood zone and index-based livestock insurance in the pastoralism-and-transhumance zone could prevent farmers and pastoralists from adopting costly coping mechanisms such as selling livestock and other assets, reducing food intake, or withdrawing children from school in the event of a shock. Moreover, mitigating exposure to crop-related risks would enable farmers to invest in higher-value cash crops such as cotton, rather than relying on low-value cereal grains such as millet and sorghum.

Addressing Gender Disparities

Women and girls play a crucial role in breaking cycles of intergenerational poverty, and the success of the government's poverty-reduction efforts will hinge on providing equitable access to education, health, and productive opportunities. Policies designed to address gender disparities must reflect the unique constraints that women face and the influence of social norms on women's voice and agency within their households and in the society as a whole. While gender parity is a cross-cutting issue that should be mainstreamed into all poverty-reduction policies, dedicated interventions should target gaps in human capital investment, customary practices related to land and asset ownership, early marriage and childbearing, decision-making practices within households and communities, the division of labor for household tasks, and the critical issue of gender-based violence.

INTRODUCTION

This poverty assessment analyzes trends in monetary and nonmonetary aspects of poverty in Niger, mainly based on two nationally representative household expenditure surveys conducted by the INS in 2014 and 2018/19. The study determines the drivers of poverty reduction by looking at location, demography, labor, assets ownership dimensions. The report also discusses cross-cutting issues relevant for poverty reduction, such as service delivery, human capital, gender, and shocks. This study aims to provide policy makers with the knowledge needed to improve the effectiveness of their programs to reduce and finally eradicate extreme poverty in Niger.

This report examines Niger's progress in reducing poverty over five years, with a specific focus on the period 2014 to 2019. The focus on this period is due to data availability. Niger's progress in reducing poverty from 2014 and 2019 is substantial. A reduction of 5.4 percentage points was mainly driven by rural areas. On the opposite, poverty has increased in urban areas. The observed reduction is in line with the macroeconomic performance observed during the same period where annual GDP growth average 5.6 percent.

At seven births per woman, Niger has the highest fertility rate in the world, resulting in high dependency ratio. Moreover, the majority of the population is still living in rural areas, relying mainly on agriculture for livelihood. The dispersion and low density of the population, especially in rural areas makes it very difficult to provide public service to the population. As a consequence, the country is performing poorly in terms of access to basic services such as electricity and piped water.

Unfortunately, data collection effort has been inconsistent in Niger and therefore, the country has only two household consumption surveys that are ready to be use in a robust and consistent way for this report: the 2014 and 2018/19 EHCVM surveys. These two surveys are nationally representative cross sections and it is from this series that the official monetary poverty and other MDGs estimates are derived. But poverty estimates from the two EHCVM are not directly comparable, adjustments were made in order to come-up with robust overtime poverty estimates. Data from the WDI are also used to assess the country's performance compared to its peers.

The various analysis conducted under this poverty assessment has proven to be critical in understanding poverty in Niger. It has served as a learning experience for World Bank staff as well as government officials, and builds the ground for future collaboration in planning and analysis of the upcoming 2021 EHCVM survey.

This poverty assessment consists of four chapters. The first chapter presents levels and main trends in monetary and nonmonetary poverty. In addition, the chapter examines the incidence of consumption growth and uses regressions and decompositions to examine the drivers of consumption growth and poverty reduction, focusing in particular on four important factors that are derived from the literature: location, demographics, education, assets ownership, and labor. The second chapter explores the main income sources for rural households. In particular, the chapter highlights the importance of agriculture for rural households. A special attention is given to constraints faced by farmers, including issues related to access to land, access to agricultural inputs, access to productive assets, access to financial services including insurance, low productivity, gender gaps, and difficulties to access markets/commercialization. Chapter 3 relies on descriptive and inferential statistics to provide information on incidence of shocks, households coping mechanisms, and effect of shocks on welfare. Chapter 4 provides an assessment of human capital endowments, and how this relates to welfare.

1 NIGER'S PROGRESS IN REDUCING POVERTY

1.1. Recent development in poverty, food security, and inequality

Poverty estimates used in this section are based on the recent official household survey, Harmonized Living Conditions Household Survey (EHCVM) 2018/19. This survey was conducted by the National Institute of Statistic and Demography of Niger (INSD), financed by the World Bank with support from the WAEMU Commission. Box 1 provides a brief description of the EHCVM survey. The methodology of poverty measurement is discussed in Box 2 and technical details are available in Annex 1. Throughout this report, the term "poverty" refers to "national poverty" unless indicated otherwise.

1.1.1. POVERTY CONTINUES TO BE A RURAL PHENOMENON

Based on the official household data, poverty in Niger continues to be a rural phenomenon in 2019. Among 9 million poor inhabitants, over 95 percent reside in rural areas (Figure 1). Close to half of rural population do not meet their basic nutritional and non-food needs, compared to 12 percent of urban population. Not only do rural inhabitants have higher risk of being poor, but they also fall deeper into poverty compared to their peers in urban areas (Table 1).

Despite the great concentration of poverty in rural areas, particular attention must be given to urban poverty as well. Close to 450,000 poor lives in urban areas, and most of them are concentrated in the Tahoua, Maradi and Dosso regions. It is important to note that these regions include some of the biggest cities in Niger. A concentration of poverty in urban areas can be source of social tension, therefore, urban areas shouldn't be excluded when designing pro-poor programs.

Poverty incidence is the same for male and female headed households. Poverty rate among female headed households is 40.7 percent (Figure 2), that is the exact same estimate as for male headed households (40.8%).

Box 1. What is the official household survey EHCVM 2018/19?

The Niger EHCVM 2018/19 is part of the joint effort between the National Statistic Offices, the World Bank and the WAEMU Commission to conduct new nationally-representative household surveys in each of the 8 WAEMU member countries. For Niger, the advantages of the newly introduced survey, EHCVM 2018/19, are threefold: (i) it follows international standards for poverty measures, (ii) it is comparable to the same household surveys conducted in other WAEMU countries, and (iii) it will be comparable to the next EHCVM survey planned in 2021/22. The EHCVM 2018/19 is representative at national level, regional level, and urban/rural level, and consists of 20 modules covering household consumption, food security, health, education, access to services, etc. While the EHCVM 2018/19 is comparable to the EHCVM 2014 in terms of survey design and implementation, the methodology to measure poverty differs significantly. To address the critical question of how to estimate changes in poverty between 2014 and 2018/19, we reconstruct household consumption aggregate in 2014 using the 2018 methodology to obtain the comparability between two years.

Table 1. Poverty Measures for Niger in 2019

	National poverty (%)		
	Headcount	**Depth**	**Severity**
National	40.8	11.2	4.3
Distribution of rural poor	11.8	2.4	0.7
Rural	46.8	13.0	5.0

Figure 1. 95 percent of the poor reside in rural areas
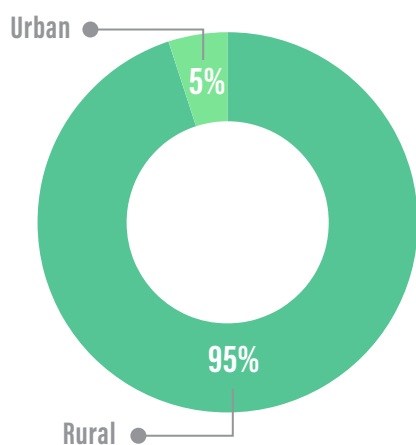
Source : World Bank staff calculation based on EHCVM 2018/19

Figure 2. Poverty incidence is the same for male and female headed households
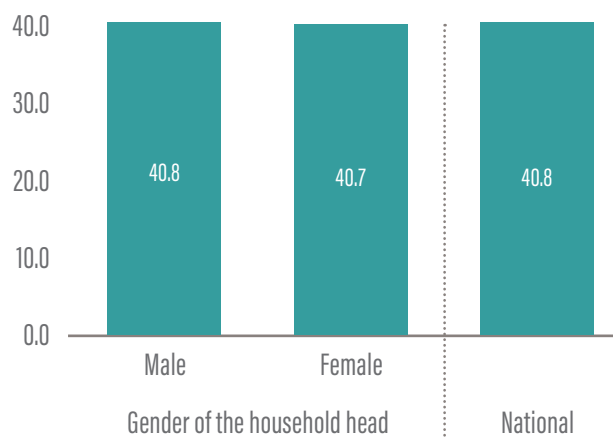
Source: World Bank staff calculation based on EHCVM 2018/19

Box 2. How is poverty measured in 2019?

Poverty measures are based on two building blocks: consumption aggregates and poverty lines. The consumption aggregate represents annual household consumption, and is calculated by aggregating food consumption, non-food consumption in non-durable goods and service, the use value of durable goods, and the imputed rent of owner-occupied and rent-free households. Food consumption comes from different sources: purchases in the market, households' own production (cereals, vegetable, meat, etc.), food received from private or public transfers, and food away from home. The second component, non-food consumption covers households and personal expenses, as well as expenses on health and education. To measure the annual usage value of each durable asset, purchasing value, replacement value, depreciation rate and interest rate are taken into account. Finally, rent value is applied based on imputation from location and lodging conditions such as construction materials and access to services.

The poverty line is the value of the welfare indicator that allows individuals to satisfy their minimum vital needs. Our approach follows the cost of basic needs proposed in Ravallion (1998) and is constructed in two steps. First, the food poverty line is estimated from a basket of food items providing each individual with 2,300 kilocalories, which is within the range of the internationally accepted standard. Second, a share of non-food expenditure is added to the food poverty line to constitute the national poverty line. See Annex 1 for further details.

1.1.2. THERE ARE STRIKING DISPARITIES IN REGIONAL POVERTY

There are striking disparities in poverty at the sub-national level. As of 2019, a Nigerien inhabitant in Niamey has only a 7-percent chance of being poor while this probability for a person living in Dosso region is 48 percent. Being the richest region in the country, Niamey houses very few poor people. The region has the lowest national poverty rate in the country, at only 7 percent. Unlike neighboring countries such as Cote d'Ivoire and Togo where the capitals have the biggest concentration of the poor despite relatively low poverty rates, Niamey accommodates less than 1 percent of the total poor population (Figure 3 and Figure 4). Such within-country disparities can present a potential source of increasing tensions between poorer and richer areas, and potentially affect the country's future growth and security situation.

Dosso, Zinder, and Maradi regions are by far the most lagging regions. They have the highest *poverty rate*: more than 45 percent of their population are below the national poverty line. Out of all 8 regions, Zinder and Maradi houses the largest *poverty mass*, or the number of the poor – nearly half of Nigerien poor live in these two regions alone (Figure 6). Trailing behind Niamey, Dosso and Maradi have the highest *poverty density* in the country, at 37 and 49

poor people per square kilometer respectively (Figure 5). Niamey has the highest poverty density because of its tiny land area although it houses few poor people as mentioned above. This measure of poverty is particularly important for policy makers on service delivery programs. In this context, services may come in many forms and include social services such as primary education for all, economic services such as irrigation systems for poor farmers, or information services such as mobile phone coverage. The spatial distribution of poverty density and maps of current public services coverage are critical for policy makers to decide whether a new service delivery program can be offered, or an existing program can be expanded in a cost-effective way. If so, how many locations can the programs reach, and where are these locations to be found? The coverage of such programs depends heavily on the projected costs (e.g., upfront investment such as schools, piping for water connections, electricity lines and poles, etc.), which in turn are largely determined by the density of users and the current status of public service coverage.

To target poverty, it is important to pay attention to two lagging regions: Zinder and Maradi. As mentioned above, these two regions alone accommodate half of the poor population (Figure 6). This compelling concentration of the number of poor in Zinder and Maradi is crucial for budget allocation across regions, and cost estimates of a social policy targeted the poor, such as social safety net programs.

Table 2. Regional poverty headcount, poverty mass, and poverty density

	Poverty headcount (%)	Poverty mass (number of poor)	Poverty density (num of poor/km2)
Agadez	14.6	84,447	0.1
Diffa	34.0	246,549	1.6
Dosso	48.4	1,263,413	13.2
Maradi	46.1	2,063,754	14.4
Tahoua	35.7	1,492,671	14.9
Tillaberi	42.3	1,451,170	37.3
Zinder	47.8	2,249,417	49.4
Niamey	6.9	81,414	202.5

Source: World Bank staff calculation based on EHCVM 2018/19.

Figure 3. Poverty prevalence is highest in Dosso, Zinder, and Maradi regions
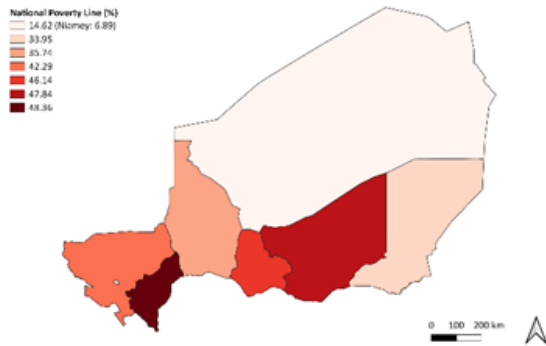
Figure 4. The poor concentrates in Dosso and Maradi.
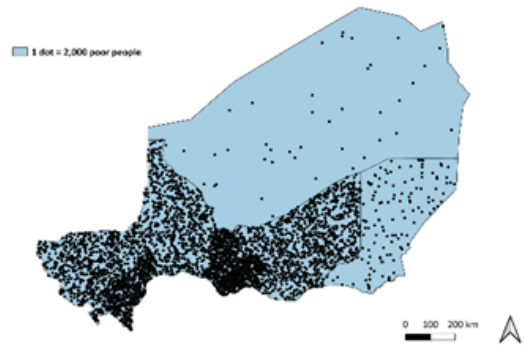
Figure 5. Niamey, Dosso, and Maradi regions have the highest number of poor per square kilometer.
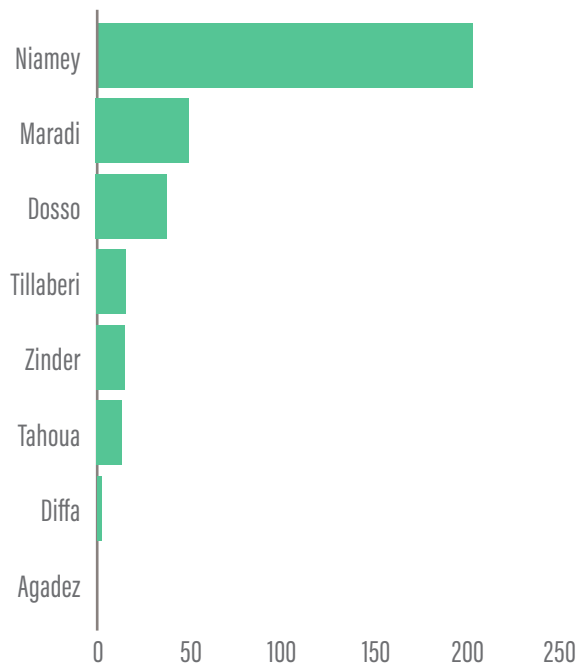
Figure 6. Half of Nigerien poor reside in Zinder and Maradi regions.
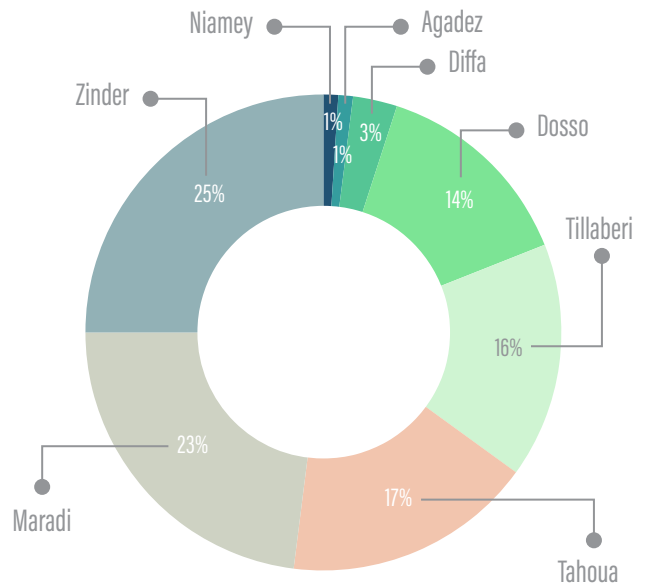
Source: World Bank staff calculation based on EHCVM 2018/19

1.1.3. SOCIAL ASSISTANCE DOES NOT SEEM TO REACH REGIONS IN NEED

Moreover, Nigerien people in Maradi, Zinder, Dosso, and Tillaberi regions are the most vulnerable to food insecurity.[2] These regions are also the poorest in the country where households tend to devote the largest proportion of their budget on food (Figure 7), thus are more vulnerable to food insecurity. Nearly one in every five inhabitants in Maradi and Zinder regions does not have the minimum 2,300 calories intake per day. Meanwhile, about 15 percent of the population in Dosso and Tillaberi regions face food shortage.

Yet, food assistance does not seem to reach regions in need. Food assistance is the biggest program in the social protection system in terms of population coverage. Nationwide, about 15 percent of Nigerien households receive food support, either through food for work, school feeding, or cereal distribution. In Niger, more than 80 percent of food assistance beneficiaries receive cereal

distribution. However, only one out of the four regions with the highest food insecurity prevalence benefit significantly from these programs (Figure 8). Dosso region has nearly 15 percent of its population living below the food poverty line and food support program reached 26 percent of the population. Nevertheless, the coverage of these program is relatively low in the other top three food insecurity regions, namely Maradi, Zinder, and Tillaberi. Only 8, 10, and 14 percent of the population in these regions, respectively, benefits from food support. It is important to note that the region with the largest food assistance coverage has a relatively low level of food insecurity. In Diffa region, only 7 percent of its inhabitant are food-insecure, yet 27 percent of the population receive some types of food support.

Coverage of cash transfer programs is limited across country. On average, less than 1 percent of households benefit from either cash transfers or cash for work. Again, Diffa region has the highest coverage of cash transfer, at nearly 5 percent of its population benefiting from cash support. (Figure 9).

Figure 7. Nearly two thirds of the budget was spent on food in Zinder, Tillaberi, Maradi and Tahoua regions.
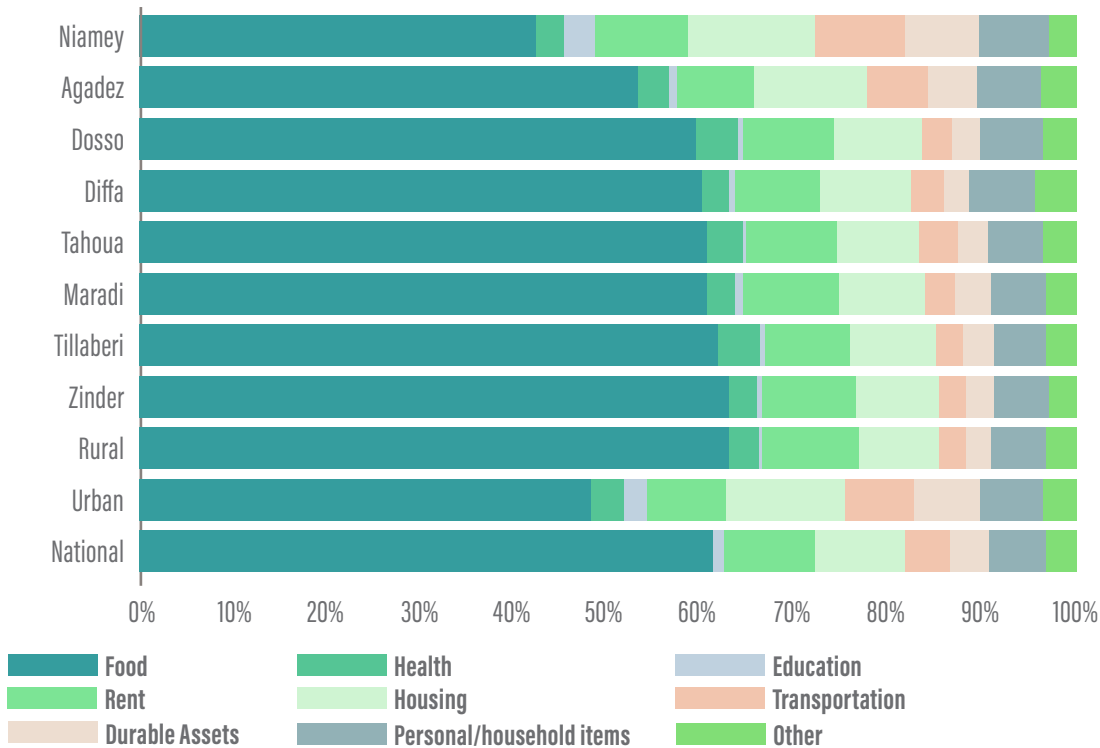
Source: World Bank staff calculation based on EHCVM 2018/19.

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2   Defined as the share of Nigerien population below the food poverty line.

Figure 8. Food assistance does not seem to reach region in need

Figure 9. Poverty and cash transfer
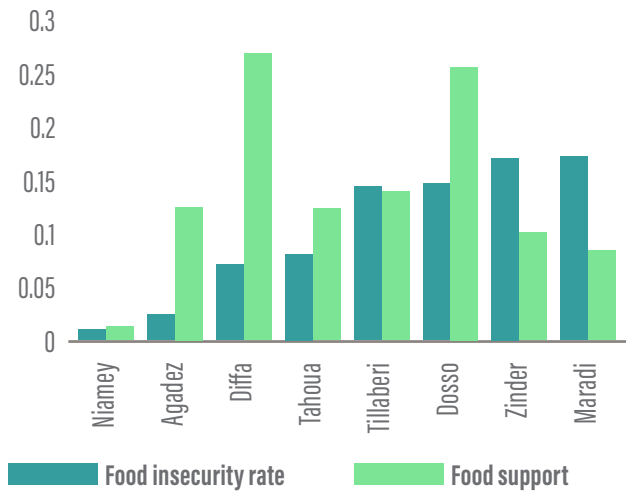
Source: World Bank staff calculation based on EHCVM 2018/19.

1.1.4. DIVERSIFICATION OF NIGERIEN FOOD BASKET IS LOW

Households in lagging regions, Tillaberi, Maradi, and Tahoua, face another challenge: low diversification of food intake. It is arguable that limited availability of food options will affect individuals' diet and nutrition that is necessary to maintain a healthy lifestyle and physical and cognitive development, particularly for children. We use the Herfindahl Index (HI), also known as the Hirschman Index or Hirschman-Herfindahl Index as an inverse measure of variety in food consumption.[3] The HI ranges from 1/n to 1, and reaches a maximum value of 1 if the share of consumption is entirely concentrated on a single food item. In other words, the HI measures diversity, where the higher the value of the index, the lower the diversity (Lee and Brown, 1989). Figure 10 suggests that Tillaberi, Maradi, and Tahoua population have a less diverse food basket than their fellow citizens living in the rest of the country. In these regions, about a quarter of household food consumption come from their own home production (Figure 11). This can partially explain the low diversification of food intake as home production offers a less variation of food availability than the markets.

Across most regions, up to a quarter of households' food budget is spent on two food items only, rice and millet (Figure 12). An average household in Zinder, Dosso, Maradi allocates about 20 percent of their food budget on millet alone. With a diet highly depending on a few food items, households are more vulnerable to the volatility of food prices and production which can lead to food insecurity.

Despite a high share of home production in households' food basket, about 40 percent of Nigerien households are net food buyers (Figure 13), defined as households that buy more food on the market than they sell in 2018/19 (WFP, 2009). In the case of Niger, household's sale revenue includes both agricultural and livestock production. In other words, a Nigerien household is a net food buyer when their sale revenue from agriculture and livestock is lower than their food purchase from the market. This implies that many Nigeriens are vulnerable to the fluctuation in food prices. It is expected that almost all inhabitants of Niamey are net food buyers (95 percent). However, approximately half of residents in Agadez and Tahoua regions have less food spending than revenue from food production (e.g. selling of agricultural and livestock products).

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3   The HI is calculated as the sum of squared food shares: $HI_h = \sum_{i=1}^{n} s_{ih}^2$ where the HI of household h is the sum of the budget shares s of each individual food item i consumed in household h. The HI ranges from 1/n to 1.

Figure 10. Food diversity is lowest in Tillaberi, Maradi, Tahoua region
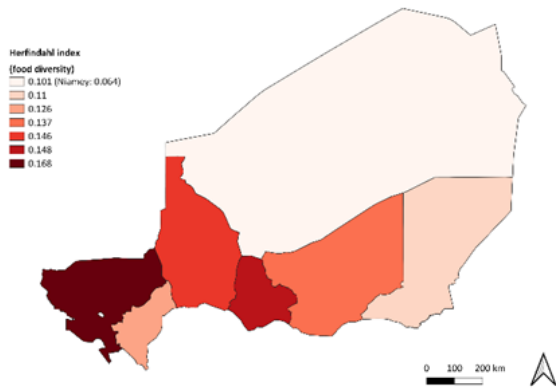
Figure 11. A quarter of the food budget comes from own production.
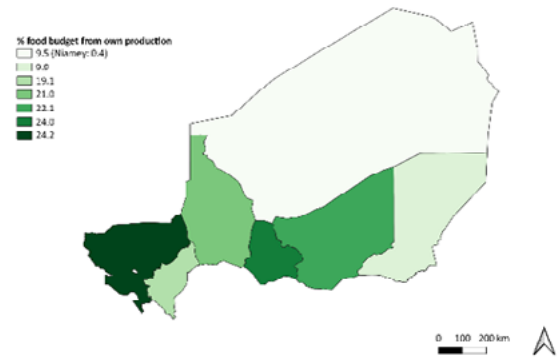
Figure 12. Nearly a quarter of food budget was spent on only two food items.
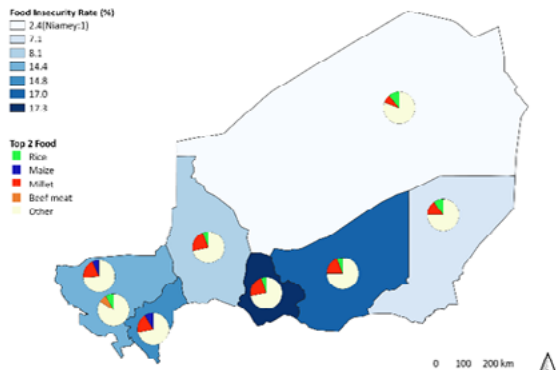
Figure 13. On average, about 40 percent of Nigerien households are net food buyers.
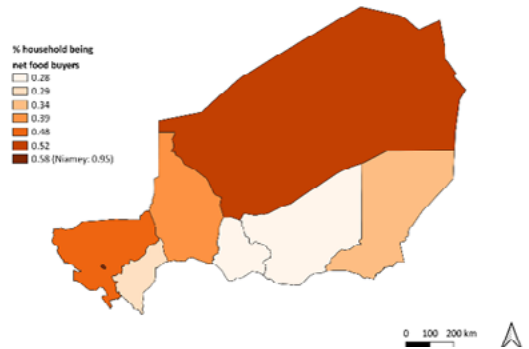
Source: World Bank staff calculation based on EHCVM 2018/19.

1.2. Trend in poverty

Poverty trend in this section is based on the two official surveys EHCVM 2014 and EHCVM 2018/19. While the two surveys are comparable in terms of survey design and implementation, the methodology of constructing household consumption aggregates deviates significantly between the two surveys. The methodology in 2018 applies a harmonized approach among WAEMU countries which follows the international standards and take into account imputation of rent and usage of durable goods. As discussed above, Annex 1 describes the 2018 approach in details. The methodology in 2014 has major differences, including handling of outliers, spatial deflators, durables goods, imputed rent among others. To compare poverty between the two years, we apply the 2018 methodology to EHCVM 2014 to reconstruct household's consumption aggregates in 2014. To maintain comparability, we also use the same poverty line as used in 2018 and adjust to 2014 prices based on the national CPI (Annex 2 provides additional results).

1.2.1. POVERTY DECLINED SIGNIFICANTLY IN RURAL AREAS AND INCREASED IN URBAN AREAS.

Over the past 5 years, poverty declined significantly, mostly from the reduction in rural poverty. On the opposite, there was an increase in the proportion of those living under the poverty line in urban areas. Between 2014 and 2018, national poverty headcount declined by 5.4-percentage points to 40.8 percent in 2018 (Table 3). A substantial improvement is recorded in rural areas where the share of rural population living under the national poverty line fell rapidly from 53.7 percent to 46.8 percent during the same period. However, urban poverty has increased from 8 percent to 11.8 percent. Urbanization is happening but at a very slow pace. Between 2014 and 2019, the share living in urban areas increased by a bit less that one percentage point. A sectoral decomposition shows that rural to urban migration is not yet substantial to affect poverty in a significant manner. Very few are migrating, and the few that migrate seems not to have the minimum endowment to be successful in accessing quality jobs and better incomes urban areas.

The pace of poverty reduction in Niger is consistent with the pace of GDP growth in the past 5 years. Between 2014 and 2018, Niger's average GDP growth was solid at nearly 6 percent per year, and was relatively even across years. The agricultural sector which employs most of the poor has seen not only substantial growth during this period, but also higher growth than the industry, manufacture and services sectors (Table 4). Despite a deep GDP contraction in 2015, growth in the agriculture sector averaged 7 percent per year.

Table 3. Poverty trend 2014-2018

	2014 official			2014 reconstructed for comparability			2018 official		
	Headcount	Depth	Severity	Headcount	Depth	Severity	Headcount	Depth	Severity
National	44.1	13.1	5.4	46.2	14.7	6.3	40.8	11.2	4.3
Urban	8.6	1.4	0.4	8.0	1.4	0.4	11.8	2.4	0.7
Rural	51.0	15.4	6.3	53.7	17.2	7.5	46.8	13.0	5.0

Source: World Bank staff calculation based on EHCVM 2018/19 and EHCVM 2014.

Table 4. GDP annual growth

Annual % growth	2014	2015	2016	2017	2018
GDP	7.5	4.3	4.9	4.9	6.5
GDP per capita	3.4	0.4	1.0	0.9	2.5
Agriculture	8.3	1.9	11.1	5.7	7.5
Industry	0.8	-0.8	3.7	5.6	3.2
Manufacture	1.3	1.8	5.9	5.9	1.9
Services	9.5	7.3	2.7	4.4	6.9

Source: World Bank staff calculation based on World Development Indicators 2019.

1.2.2. CONSUMPTION GROWTH FAVORS THE POOREST, AND WELFARE GAP BETWEEN THE POOREST AND RICHEST REGIONS HAS NARROWED.

Growth in consumption was pro- poor. As shown in growth incidence curves (Figure 14), growth in real consumption per capita between 2014 and 2018 was highest among households in the bottom of the consumption distribution where the poorest decile experienced a 5-percent annual growth in consumption. Gains were particularly high in rural areas where all households in the bottom 70 percent of the consumption distribution had positive growth. However, in rural areas, those in the top 30 percent of the consumption distribution have experienced a decrease of their consumption. In urban areas, the bottom 80 percent had a negative growth, while the top 20 percent had a positive growth. This resulted in a reduction of inequality, the Gini index decreasing from 36.9% in 2014 to 35.0% in 2018.

Consumption gains were widely shared geographically as well, with substantial progress in the poorest regions, Dosso, Maradi, and Zinders. Between 2014 and 2018, poverty declined sharply by 17.6 percentage points, 16.6 percentage points, and 5.7 percentage points in these regions, respectively (Table 5). Although they remain the poorest regions in Niger, the welfare gap to the richest region has shrunk. In fact, median consumption in Dosso, Maradi, and Zinders increased significantly by 24 percent, 21 percent, and 7 percent respectively compared to a national average of 5 percent growth.

Figure 14. Consumption growth favors the poorest.
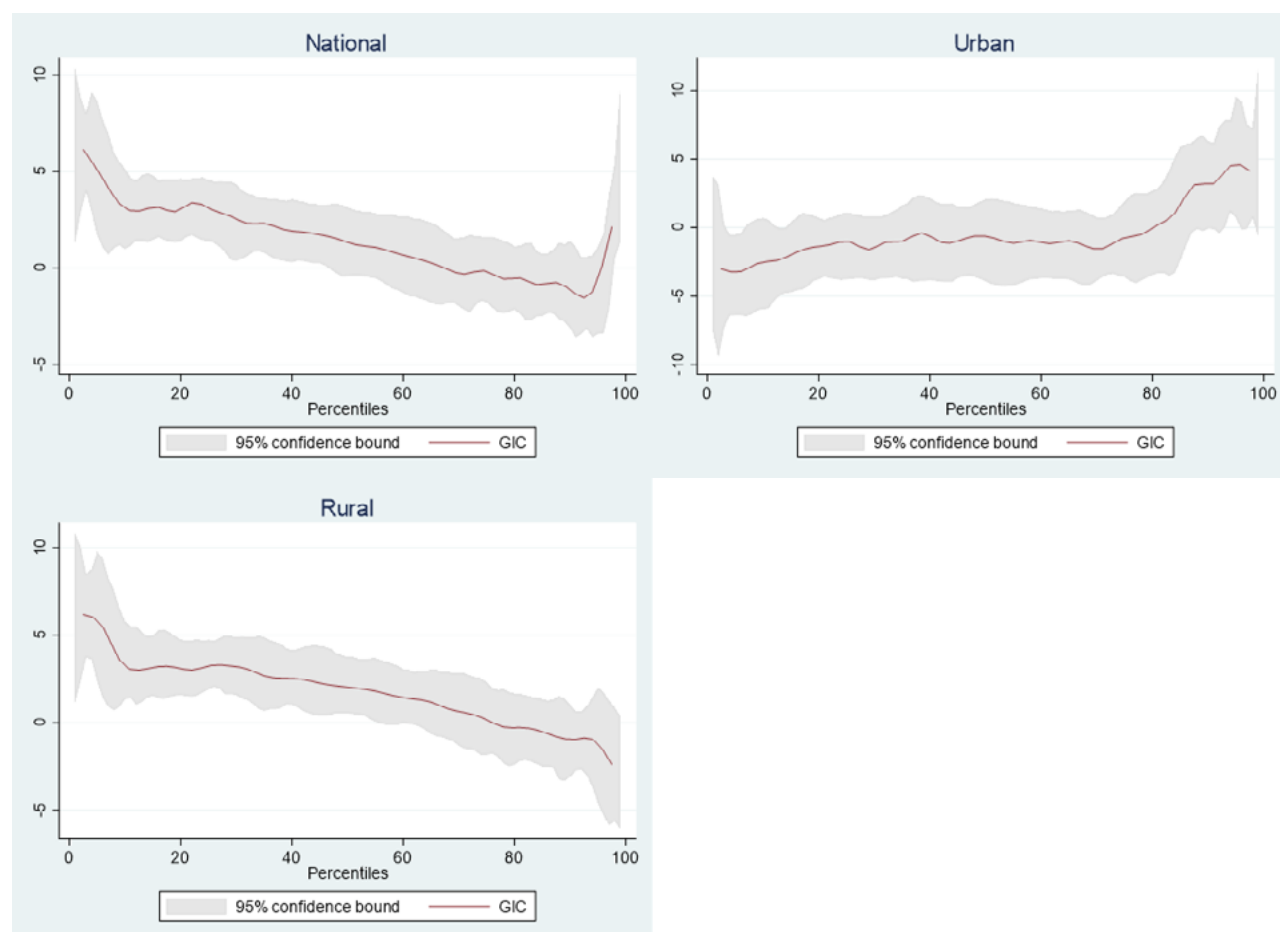
Table 5. Poverty declined significantly across all regions, particularly Dosso, Zinder, and Maradi.

Region	2014 official	2014 reconstructed for comparability	2018 official	Change
Agadez	9.9	6.2	14.6	8.4
Diffa	32.9	38.8	34.0	-4.8
Dosso	57.4	66.0	48.4	-17.6
Maradi	65.0	62.7	46.1	-16.6
Tahoua	27.6	28.7	35.7	7.0
Tillabéri	40.0	46.4	42.3	-4.1
Zinder	52.7	53.5	47.8	-5.7
Niamey	5.2	7.5	6.9	-0.6
National	44.1	46.2	40.8	-5.4

Source: World Bank staff calculation based on World Development Indicators 2019.

1.2.3. BUT NIGERIEN'S PERCEPTION OF ECONOMIC GROWTH HAS BEEN NEGATIVE

Interestingly, Nigerien people's perception of progress in economic condition over the past 5 years is negative, and contradicts the decline in poverty trend. Between 2014 and 2018, the share of population describing the country's economic situation as good or very good declined

significantly, from 70 percent to 25 percent. Similarly, fewer people believe their own household living conditions were in good position in 2018 than in 2014 (Figure 15). During the same period, the proportion of Nigerien population indicating that they never experienced food hunger, lack of portable water, medical care, or cooking fuel dropped significantly (Figure 16).

Figure 15. Fewer people believe the country's economic situation and their own living conditions were good in 2018 than in 2014.
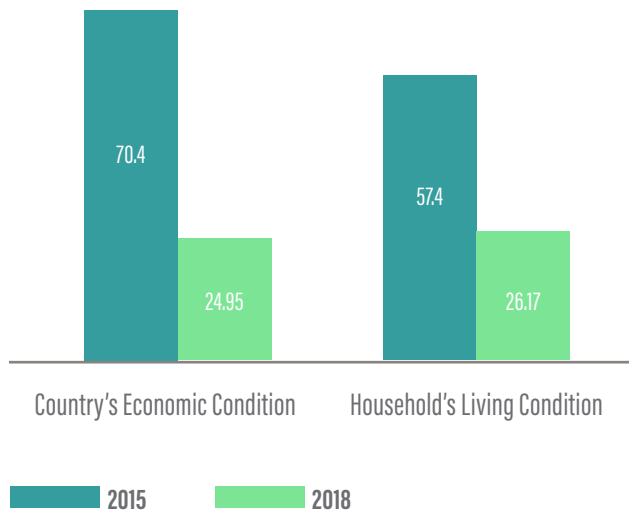
Figure 16. Fewer people indicated that they never experienced food hunger, lack of portable water, medical care, or cooking fuel.
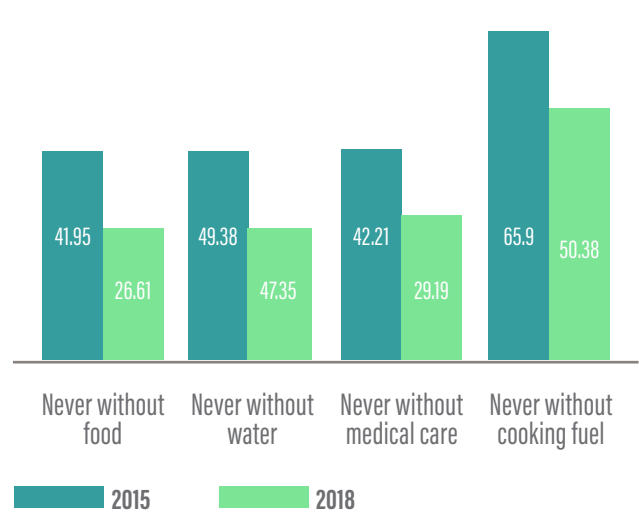
Source: World Bank staff calculation based on Afrobarometer 2015 and 2018

1.3. Non-monetary dimensions of welfare

1.3.1. THE POOR HAVE ACCUMULATED DURABLE ASSETS AND GAINED SLIGHTLY MORE ACCESS TO FINANCIAL SERVICES

The share of Nigerien people living in multi-deprivation has declined. Going beyond the sole focus on monetary measure of poverty, the multi-deprivation indicator takes into account access to health and education services, access to other basic services such as electricity, water, and sanitation, as well as housing conditions and asset ownership

(see Annex 3 for details). The level of improvement across these non-monetary dimensions indicates more favorable conditions for households to avail themselves of economic opportunities and raise the quality of their living condition. Measured against this indicator, Niger has made significant progress. Between 2014 and 2018, the percentage of people living in multi-deprivation has dramatically dropped from 70 percent to 60 percent. The level of progress is observed across all regions (Figure 17), with remarkable improvement recorded in Agadez and Dosso regions.

Figure 17. The share of Nigerien people living in multi-deprivation has declined across all regions.
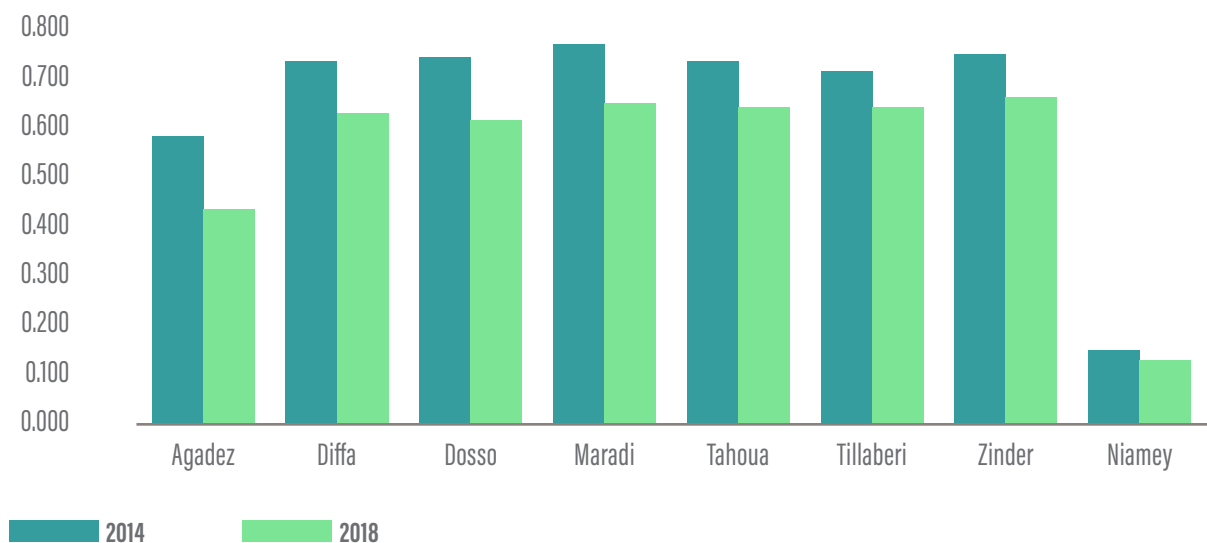
Source: World Bank staff calculation from EHCVM 2014 and EHCVM 2018/19.

At the same time, the poor accumulated some durable and financial assets. Ownership of modern assets such as mobile phones and motorcycle has increased, especially mobile phone coverage among the poor (Figure 18). For the bottom 40 percent of the consumption distribution, the rate of mobile money coverage was merely 3 percent in 2014. This number increased slightly in 2017 with significant improvement among households in the second quintile of the income distribution (Figure 19). In parallel to the expansion of mobile phone coverage, access to financial services, particularly mobile banking, has improved albeit still with slow progress. Ownership of a bank account increased substantially among the rich, but the progress is much slower for those at the bottom of the income distribution (Figure 19). However, financial savings and capacity to borrow have declined dramatically for all Nigeriens, particularly for the poorest (Figure 20). Between 2014 and 2017, the share of Nigerien people in the lowest quintile of the consumption distribution with financial savings plummets from 55 to 14 percent. During the same period, the proportion of the poorest who were able to borrow also declined from 59 to 44 percent. While the slight improvement in financial tools like mobile banking signals a promising future, the fact that poor households are less capable of saving and borrowing is a worrisome sign that they might be more vulnerable to short-run economic shock.

Figure 18. Asset ownership has increased, particularly mobile phones among the poor.
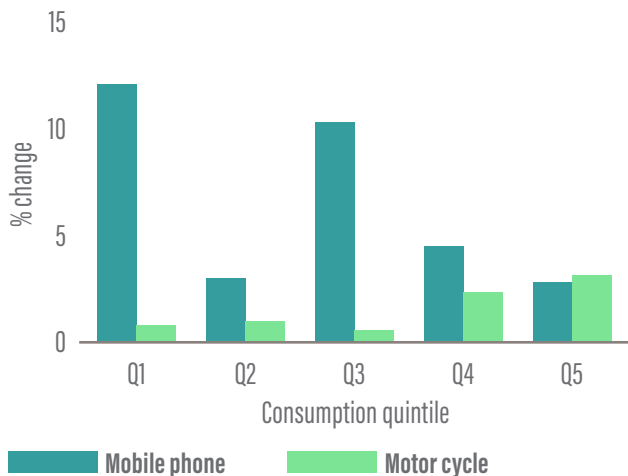
Source: World Bank staff calculation based on EHCVM 2014 and EHCVM 2018/19

Figure 19. Access to financial services, especially mobile money, has improved.
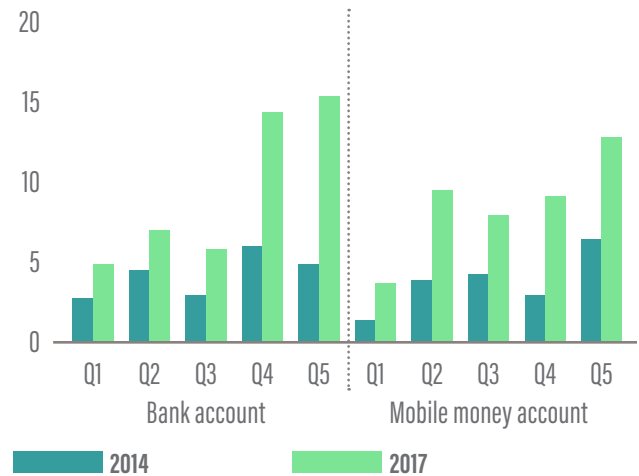
Source: World Bank staff calculation based on FINDEX 2014 and 2017.

Figure 20. Capacity to save money has increase among the poorest
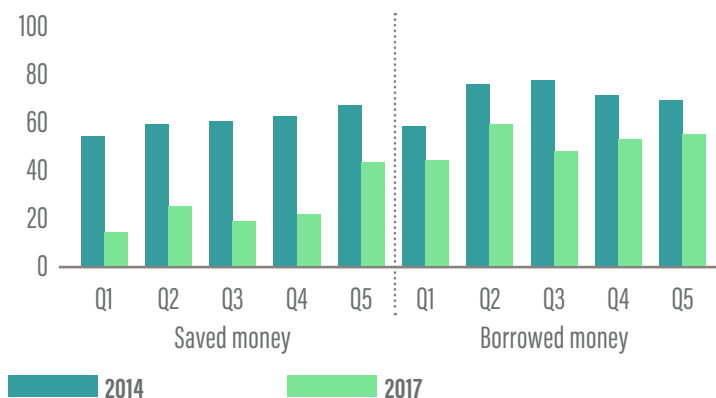
Source: World Bank staff calculation based on FINDEX 2014 and 2017.

1.3.2. BUT PROGRESS ON ACCESS TO BASIC SERVICES AND ACHIEVEMENT IN HUMAN DEVELOPMENT REMAIN LIMITED AMONG THE POOR

For the poor, access to basic services is extremely limited and has seen little progress over time. Absolute levels of access are still very low compared to the regional average, while the gap in progress between those at the top 60 percent and bottom 40 percent of the consumption distribution has widened slightly. For instance, only 16 Nigerien households had access to electricity in 2018, compared to nearly one in every two SSA residents (World Development Indicators 2019). While this level of electricity coverage already reflects a modest improvement from 2014, the progress skews toward the richer proportion of the population. Access to electricity remains extremely low with little improvement among the bottom 40 of the consumption distribution (Figure 21). Compared to electricity, coverage of piped water is slightly better for the poor. In 2018, a quarter of households in the bottom 40 percent had connection to piped water marking a significant progress since 2014. However, this level is still much lower than the access level among the better-off population where nearly half of them had piped water connected to the house (Figure 24).

Coverage of electricity is also uneven across regions, and progress has been slow. The level of access is disproportionally high in Niamey where at least two thirds of its residents had connection to electricity in 2018. Meanwhile, in the poorest regions, namely Zinder, Dosso, and Maradi, only 10 percent of the households had access. Improvement on electricity access has been stagnant in all regions except in Tillaberi and Tahuoa regions (Figure 22).

Compared to electricity, the regional gap in access to piped water is narrower, and noticeable improvement is recorded. The level of access is still highest in the capital with more than 80 percent of its inhabitants had access to piped water in 2018. However, other regions are catching up, especially Diffa, Maradi and Dosso region (Figure 23). In 2018, 36 percent of the residents in Diffa region had connection to piped water marking a sharp increase from 16 percent in 2014. Maradi region has also seen an impressive trend with 47-percent and 32-percent coverage in 2018 and 2014 respectively. Similarly, Dosso region increased its coverage from 20 percent to 30 percent of the population during the same period.

Figure 21 : Access to electricity increased, but not much for the bottom 40 percent...

Source: World Bank staff calculation based on EHCVM 2014 and EHCVM 2018/19.

Figure 22 : And not much for the lagging regions.
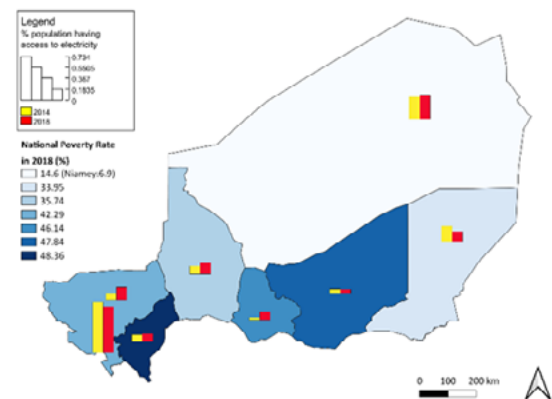
Figure 23 : Access to piped water is limited in the lagging regions but progress has been significant...

Figure 24 : Many more poor people had access to piped water in 2018 than in 2014.
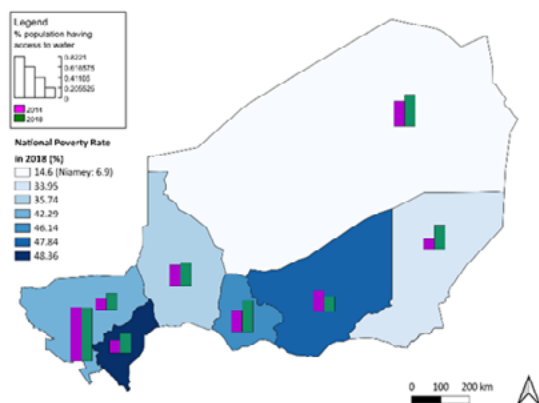
Source: World Bank staff calculation based on EHCVM 2014 and EHCVM 2018/19.

Although public resources allocated to education has declined over the past years, encouraging trend is still observed. Between 2014 and 2018, while government expenditure on education has declined from 7 percent to 5 percent, it is still slightly higher than the regional average (Table 6). Some indicators of education attainment have improved, but others are still much lower than the average of the SSA region. As of 2017, 65 percent of school-age children were enrolled in primary school, a 5-percentage point increase from the figure in 2014. Progress is also

recorded for secondary school enrollment. However, despite a relatively high school enrolment rate, the completion rate is dismay reflecting the low quality of education, social norms, perceived returns to education, and opportunity cost. Albeit some small progress, the completion rates for primary and lower secondary school in 2018 were 20 percent and 19 percent respectively signaling that Niger will still need significant effort and investment to catch up with the regional average.

Table 6 : Indicators of Educational Investment and Attainment

	Niger		SSA	
	2014	2018	2014	2018
Government expenditure on education, total (% of GDP)	6.7	4.9	4.3	4.6
Government expenditure on education, total (% of government budget)	21.7	16.8	17.3	17.8
School enrollment, primary (% net)	60.1	65.1*	N/A	N/A
Primary completion rate (% relevant age group)	57.6	71.6**	68.1	68.8
School enrollment, secondary (% net)	15.2	20.1*	34	35.6
Lower secondary completion rate (% relevant age group)	12.2	19	42.4	44.1

* data available in 2017
**data available in 2016
Source: World Development Indicators 2019

As of now, Niger is still among the bottom in the Human Capital Index ranking. According to cross-country regression analysis, Niger net primary enrollment and completion rates are below expected level when compared to other countries with similar incomes (Figure 25 and Figure 26). In addition, enrollment in secondary school remains very low while net enrollment in primary schools is relatively high. Only 20 percent of school age children were enrolled in secondary school in 2017. This means the increase in primary school enrollment and completion rate has not successfully

translated to higher education. When focusing on the out-of-school rate (that is, the inverse of net enrolment), nearly 80 percent of lower-secondary school-age children were not in school in 2018 (WDI 2019), a rate that is significantly higher than that of its income group (Figure 27). Similarly, Niger's literacy rate remains extremely low compared to other countries with the same income level although the share of literate adults has increased from 29 percent to 33 percent over the past 5 years (Figure 28).

Figure 25. Niger net primary enrollment is below expected level when compared to other countries with similar incomes.
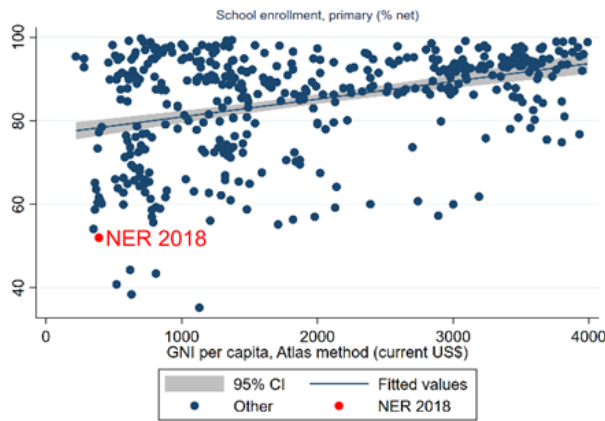
Figure 26. Similar story is observed for primary completion rate.
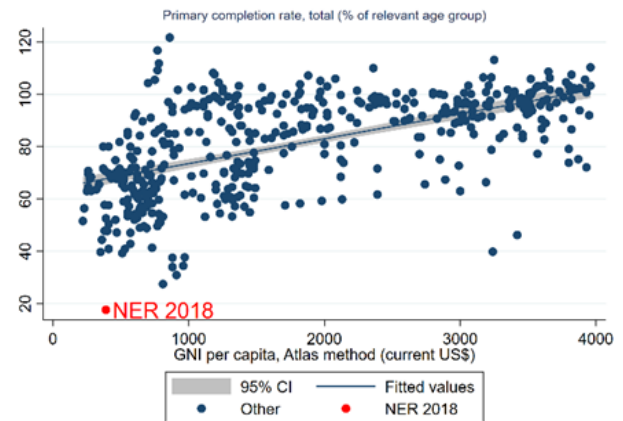
Figure 27. The country's adolescents out of school rate is significantly higher than its peers.
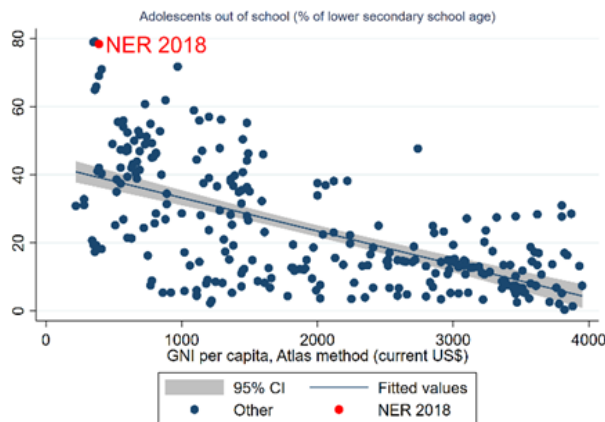
Figure 28. Adult literacy rate is lower than the expected level of its income group.
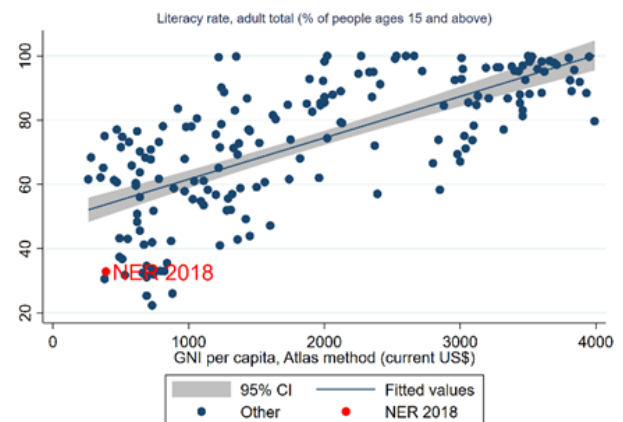
Source : World Bank staff calculation from World Development Indicator 2019.

As health expenditure increased over the past years, Niger made impressive progress in health care for children and women. Between 2014 and 2017, a larger share of GDP was allocated to health expenditure that brought the country's level of health expenditure above the regional average (Table 7). During the same period, mortality rate for children under 5 declined significantly, from 99 children per 1,000 live births to 84 although it was still higher than the SSA average. Meanwhile, a decline in maternal mortality from 573 deaths per 100,000 births down to 509 signals an improvement in maternal health between 2014 and 2018. However, a reduction in contraceptive prevalence poses a challenge to the government efforts to control the already-high fertility rate. This reverse trend can adversely affect women's health as well as their opportunity to participate in the labor market.

Table 7. Indicators of Health Investment and Attainment

	Niger		SSA	
	2014	2018	2014	2018
Current health expenditure (% of GDP)	5.9	7.7*	4.9	5.2
Mortality rate, under 5 (per 1,000 live births)	98.5	83.7	87.5	68.8
Maternal mortality ratio (per 100,000 births)	573	509	571	534.0*
Contraceptive prevalence, modern methods (% of women ages 15-49)	14.4**	10.5*	N/A	N/A

* data available in 2017
**data available in 2016
Source: World Development Indicators 2019

1.4. Drivers of poverty reduction

This section is based on the reconstructed consumption aggregates for EHCVM 2014 to ensure comparability of poverty estimates between 2014 and 2018 (see section 1.2 above or Annex 2 for more information). To understand key factors behind the observed poverty trend in Niger, a number of decomposition methods, namely growth-redistribution decomposition, non-linear Oaxaca Blinder decomposition, and unconditional quantile regressions were applied in this section (see Annex 4 for detailed results).

1.4.1. GROWTH AND REDISTRIBUTION EXPLAIN RECENT PROGRESS IN POVERTY REDUCTION; HOWEVER, REDISTRIBUTION FAVORS RURAL HOUSEHOLDS BUT NOT URBAN RESIDENTS

Overall, progress in poverty reduction in Niger comes from both growth and redistribution. Between 2014 and 2018, poverty declined by 5.4 percentage points, among which 2.9 percentage points come from growth and 2.5 percentage points from redistribution (Figure 29). In other words, redistribution and growth effects accounted each for about 50 percent of all poverty reduction in the past 5 years.

Redistribution favors poor rural households but not poor urban households. Niger has seen a substantial decline in rural poverty in the past five year. Poverty declined by 6.9 percentage points in rural areas. Economic growth contributes to only 2.7 percentage points of this reduction, while redistribution accounts for the rest (Figure 29). However, during this same period, urban poverty increased by 3.8 percentage points. This increase is explained entirely by the negative redistribution. In other words, urban poor were "taxed" more than benefits they should have received from social assistance. In a context were coverage of social protection programs is limited, the importance of the redistributive effect here could mainly be related to how the market adjusted/reacted given strong performance of the agricultural sector (mainly benefitting the poor) vs other sectors (dominated by non-poor).

Figure 29. Redistribution favors poor rural households but not poor urban households
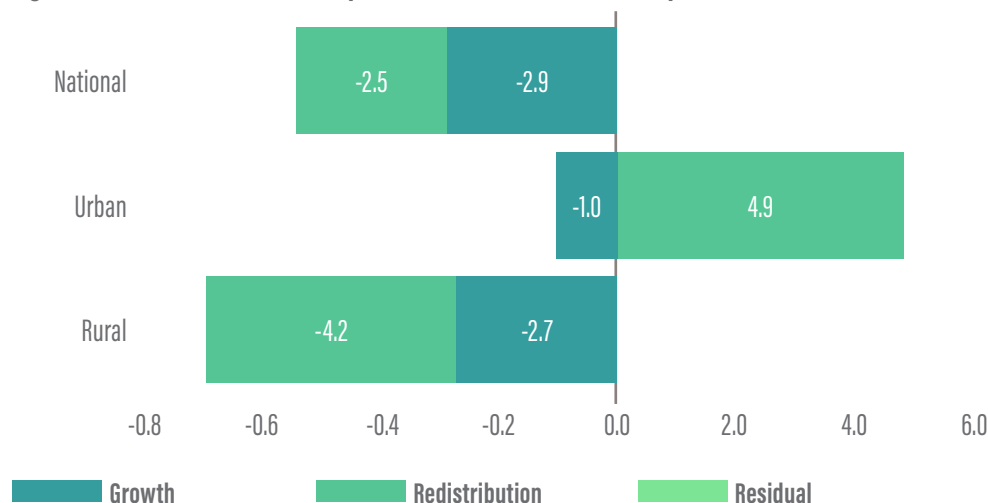
Source: World Bank staff calculation based on EHCVM 2018/19 and EHCVM 2014

1.4.2. HIGHER RETURNS TO CHANGES IN HOUSEHOLDS' LOCATION, RETURNS TO CHANGES IN INCIDENCE OF SHOCKS, RETURNS TO ACCESS TO SERVICES, AND RETURNS TO ASSET OWNERSHIP ACCOUNTS FOR A VAST MAJORITY OF CONSUMPTION GROWTH.

Overall, return to households' endowments accounts for most of the poverty reduction. Between 2014 and 2018, overall households' endowment in terms of where they live, education and employment of household members, household composition, asset ownership, and their experiences with shocks seems to have deteriorated a little bit, contributing negatively to consumption growth in Niger (Figure 30). Changes in households' endowment only explains about -3 percent decrease of the overall changes in consumption over the past 5 years. Meanwhile, returns to those endowment has increased substantially and accounts for 109 percent of consumption growth.

More specifically, the largest share of the improvement in consumption growth can be attributed to higher returns to returns to change in households' location, returns to changes in asset ownership, returns to changes in incidence of shocks, and returns to access to basic services (Figure 31). Consistent with the role of redistribution in rural poverty in section 1.4.1. above, returns to households residing in rural areas have increased significantly, and accounts for 343.1 percent of consumption growth (see Table A4.3 in Annex 4 for regression results). In addition, returns to ownership of a house has risen and makes for 37.7 percent of consumption growth. Meanwhile, higher returns to having access to clean drinking water and electricity is responsible for 80.3 percent and 15.3 percent of Nigerien growth, respectively. The negative effect of change to returns to education was driven by the number of family members with no education, which accounts for -101.9% percent decrease of consumption. Driven by the high level of fertility, returns to demographic factors accounted for a high reduction of consumption.

Figure 30. Return to households' endowment explains most of the reduction in poverty

Figure 31. Particularly, higher return to changes in households' location, asset ownership, access to service, and incidence of shocks accounts for most of the progress in poverty reduction.
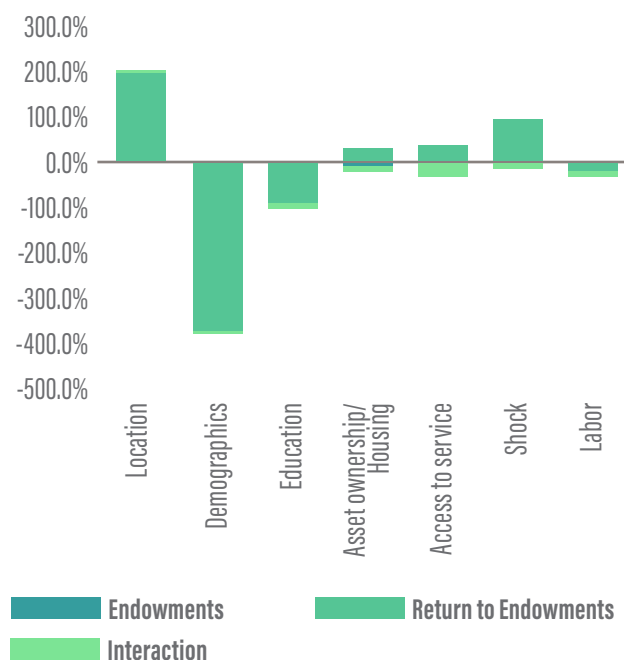
1.4.3. FOR THE POOREST, RETURNS TO HOUSEHOLDS' LOCATION, EDUCATION AND LABOR OF HOUSEHOLD MEMBERS HAS INCREASED SIGNIFICANTLY, BUT RETURNS TO HOUSEHOLD COMPOSITION AND HAS DECLINED SHARPLY.

Understandably, changes in endowment and returns to endowment are not uniform across the consumption distribution. That means, the poor may not acquire education, access to services, employment, or physical mobility at the same rate as the non-poor. In addition, the returns to these changes in endowment among the poor may not be as high as those among the rich. Thus, we use the Unconditional Quantile Regression method to explore such differences across per capita consumption quintiles. We use log of consumption per capita as the dependent variable and focus on the bottom 40 percent of the consumption distribution.

Similar to other income cohorts, households in the bottom 40 percent of the consumption distribution have seen significantly increasing returns to endowment. In fact, higher returns to households endowment of location,

education and employment of household members, household composition, asset ownership, and their experiences with shocks explain almost entirely the growth in consumption of the poorest (Figure 32). Meanwhile, changes in households' endowment play a much less important role.

Particularly for the poorest, returns to households' location, education, access to services, and labor of household members has increased significantly, but returns to household composition have declined sharply over the past 5 years. The location where a household lives continues to be a key factor in explaining the households' consumption growth. In fact, returns to being in rural areas has improved substantially and accounts for 216.1 percent of the overall growth in consumption among the bottom 40 percent of the consumption distribution. Moreover, higher returns to the number of family members being employed also makes for 147.5 percent of the consumption growth. However, returns to age of household head and number of household members without an education has continued to decline and contributes negatively to changes in household's consumption.

Figure 32. For the bottom 40 percent of the consumption distribution, returns to households' endowments accounts almost entirely for consumption growth.
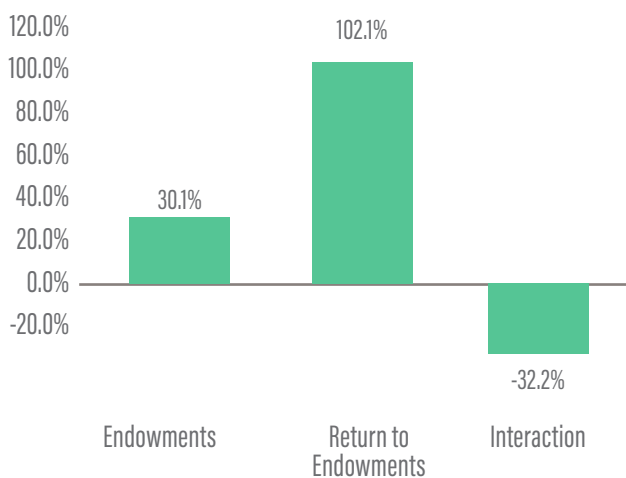
Figure 33. For the poorest, returns to households' location, education, access to services, and labor of household members has increased significantly, but returns to household composition has declined sharply.
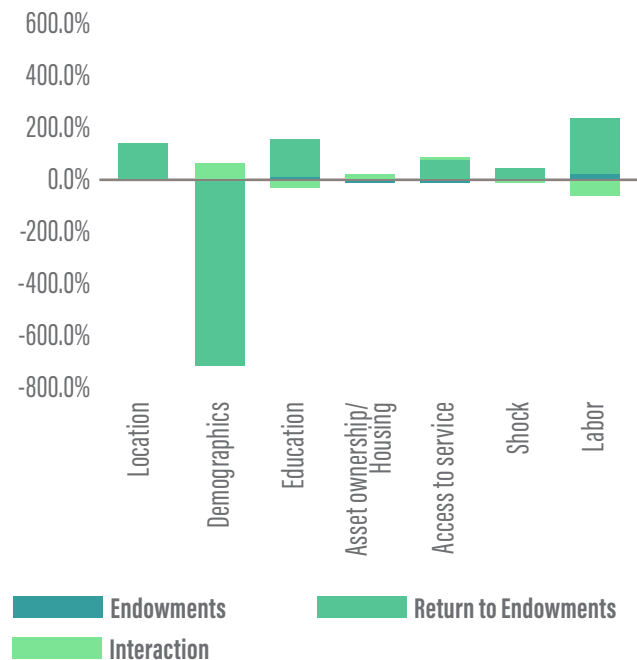
1.5. The covid-19 pandemic is likely to wipeout part of the achievement in recent years

The World Bank has partnered with the INS to conduct a high frequency household survey, tailored to monitor the impact of the Covid-19 on living conditions. It is anticipated that the Covid-19 will have negative and likely long-lasting effects on the population, in particular, the poor and most vulnerable. In addition to the direct health effect, social distancing and other containment measures have resulted worldwide in a reduction of the economic activity. Data collection for the first round was conducted in September/October 2020. The survey instruments were designed to capture a wide range of information on the socio-economic impact of the Covid-19, including knowledge and practices of recommended social behaviors, access to basic services (health and education), access to food and food insecurity, labor market and income sources including remittances, and social protection programs.

Findings of the high frequency survey are not yet available, but based on the literature, and results observed in similar countries in Africa and across the globe, it is anticipated that the pandemic will lead to a reduction of incomes/revenues, and that the poor will be the most affected. Most employees, nonfarm businesses owners and farmers will likely experience a reduction of income due to business closure and loss of incomes. By virtue of the type of job, the poor and vulnerable are more likely to stop working during Covid-19, as they cannot work from home because they are either in agriculture or in informal sector. As far as education is concerned, during Covid-19, non-poor children are less likely to remain intellectually engaged, while children from non-poor families, could afford to rely on various channels, including ICT to continued learning. To cope with income reduction, households may opt to reduce food consumption, which will ultimately increase the already challenging issue of malnutrition.

The Covid-19 pandemic and the related economic downturn is having an adverse effect on progress made on poverty reduction. Micro-macro simulations suggest that the international poverty rate will increase by at least 1.6 percentage points in 2020 due to the Covid-19, this correspond to an additional 375,000 new poor due to the Covid-19. As discussed above, one policy response from the Government will be to expand the existing social protection programs to help the poor and most vulnerable.

Given differences in how men and women are being affected by the Covid-19, the response to the pandemic should not be gender blind. It is important to note that men and women will not be affected the same way by the Covid-19. Existing literature[4] suggest that there is gender differentiated transmission channels and impacts on outcomes across the three areas of (i) endowments; (ii) economic conditions; and (iii) and agency. On endowments, it is demonstrated that due the pandemic, health resources may be shifted away from women's health services, which could have critical impact on women in short and long term. In some places, due to reduction of income and social norms could affect intra-household allocation of resources, with a preference of investing in boy's education. Due to school closure, drop out could be higher for girls because of prevalence of child marriage and teenage pregnancy. All these resulting in growing gender gaps. On economic conditions, women will experience more pressure on their time, for instance with school closure they will have to spend more time taking care of children, limiting the time they could spend on labor market. In developing countries, women are more likely to be engaged in informal sectors, with limited social protection, and limited possibility for home-based work. Regarding gender implication for agency, it is demonstrated that the Covid-19 could results in increased gender-based violence due to confinement.

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4   For example, see De Paz et al (2020).

1.6. Conclusion

Between 2014 and 2019, the proportion of the population living below the national poverty line has declined in rural areas where most households earn their livelihood from agricultural sector. In the meantime, there was an increase in urban poverty. This chapter has documented the poverty trends, as well as main drivers of poverty between 2014 and 2019. Despite an improvement of survey methodology in 2018/19, the EHCVM remains comparable to the previous survey. However, for robust comparison overtime, poverty estimates for 2014 were recomputed using the newly proposed methodology. Findings suggest that poverty continues to be a rural phenomenon, with 95 percent of the 9 million poor living in rural areas. However, the chapters highlighted the fact that poverty pockets also exist in urban areas, and policy programs should take this into account. There are huge spatial disparities, nearly half of Nigerien poor live in these two regions: Zinder and Maradi. Coverage

of social assistance is low are poorly targeted. Monetary poverty is correlated with food insecurity, with those living in poorest region struggling to meet their nutritional needs. Between 2014 and 2019, growth favors the poorest, resulting in a reduction of inequalities.

The high fertility in the country is slowing down progress in reducing poverty. Findings from the Gender Assessment Report (World Bank ,2020) point to a set of complementary reforms that must be implemented in order to address the high population growth, mainly empowering women and young girls trough: enhancing women's entrepreneurial skills; promoting women's employment and closing the earnings gap; increasing women's productivity in agriculture; protecting adolescent girls through a legal framework; and promoting universal education.

2 RURAL INCOME GROWTH

With 95 out of 100 Nigerien poor living in rural areas, reducing poverty in Niger needs to address income growth in rural areas. This chapter aims to examine how those who currently live in rural areas can earn higher incomes in the future, and identify key opportunities for rural income growth. Rural households can boost their incomes by moving into non-agricultural sectors, through migration or by pursuing non-agricultural activities in rural areas. Such transitions need to be encouraged, but they will not have a large impact right away. In the near term, for the majority of rural Nigerien households, income growth will largely come from increases in agricultural income.

2.1. Rural income, assets, market

2.1.1. FARMING AND LIVESTOCK ACTIVITIES GENERATE AN IMPORTANT SOURCE OF INCOME, BUT OPPORTUNITIES FOR NON-FARM ARE LIMITED

The agriculture sector, including farming and livestock, continues to be the largest employer and dominates Nigerien rural household income. Although agriculture's contribution to GDP has remained stagnant at about 40 percent over the last 20 years, it is by far the largest employer nationally and in rural areas. Farming and livestock activities are the main occupation for 75 percent of Niger's workforce. On average, about 40 percent of household income is generated by agricultural activities (Figure 34). It contributes to more than half of the total income for rural households in the bottom 40 percent of the consumption distribution (Figure 35). This is relatively lower than the sub-Saharan African average of 68 percent of rural income.

Figure 34. A major source of income for rural households comes from farming and livestock activities

Share of income from different sources, by region
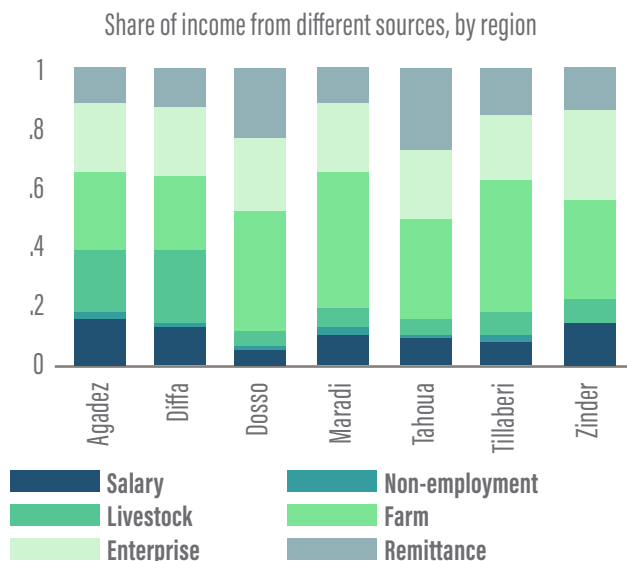
Figure 35... and also among the bottom 40 percent.

Share of income from different sources, by consumption quintiles
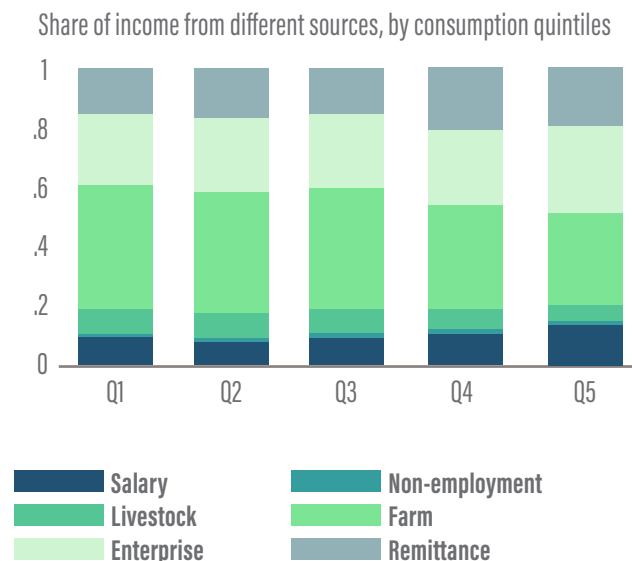
Source : World Bank staff calculation from EHCVM 2018/19.

Figure 36. Nigeriens allocate 90 percent of land area on 3 major crops: millet, sorghum, and cowpea.

Share of cultivated area, by consumption quintiles

Millet   Sorghum
Paddy rice   Cowpea
Peanut   Onion
Other crops

Source: World Bank staff calculation from EHCVM 2018/19

Figure 37. Crops grown vary by regions.

Share of cultivated area, by region
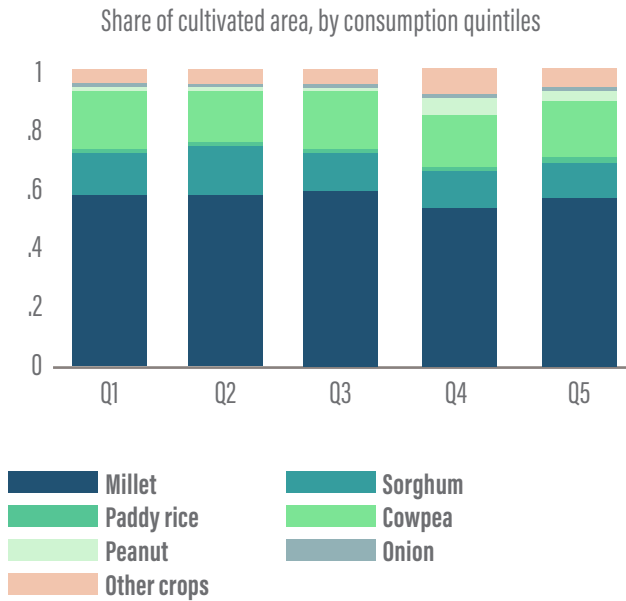
Millet   Sorghum
Paddy rice   Cowpea
Peanut   Onion
Other crops

Within the agricultural sector, farmers are largely engaged in the production of food crops, particularly rainfed cereals. Millet and sorghum are the two main staple crops in Niger and are grown by everyone across the consumption distribution (Figure 36). On average, rural households allocate at least 60 percent of their cultivated area to the production of millet alone. This trend is consistent across all regions, except Agadez where onion is the major crop and is exclusively cultivated the region (Figure 37). More than 20 percent of land in Zinder and Tahoua regions is used for sorghum plating, higher than other zones. Meanwhile, cowpea is particularly important in Dosso, Maradi, and Zinder regions.

Livestock plays a small role in income generation for rural households although it is relatively more important in the northeast part of the country. On average, livestock generates about 6 percent of rural household income despite the fact that in rural areas 95% of the households own or keep animals. In Agadez and Diffa regions where livestock serves as the main livelihood, it comprises about 23 percent of rural household income. Over 90 percent of livestock income comes from sale of live animals. Other

production of livestock such as diary or meat is extremely limited (Figure 38). The composition of animal sold varies significantly by region. Diffa region is the key hub for the commercialization of sheep, goat, and camels. Meanwhile, rural inhabitants in Agadez region only sell camels while those in Tahoua region only sell cattle.

After agricultural sector (farm and livestock), non-farm enterprise presents the second major source of income across regions. On average, 20 percent of the rural household income comes from non-farm enterprise. Trade, service, and electricity and water are the three main sectors of income generation across all wealth groups. Mining is important in the southeast as people flock to the southwestern Niger to seek fortunes on goldmining[5]. Niger's mining industry has long been centered on uranium extraction. Although since early 2000s, it has begun branching out into gold and other lucrative subterranean resources, uranium is still the largest component of the country's export, accounting for over 30 percent of total export.

5   https://theconversation.com/as-more-people-flock-to-nigers-gold-mines-economic-boon-may-become-a-new-migration-risk-75417

Figure 38. Over 90 percent of livestock income comes from sale of live animals. Other livestock production remains extremely limited.

Share of livestock income from different sources

Live animals   Meat   Skin   Milk   Eggs
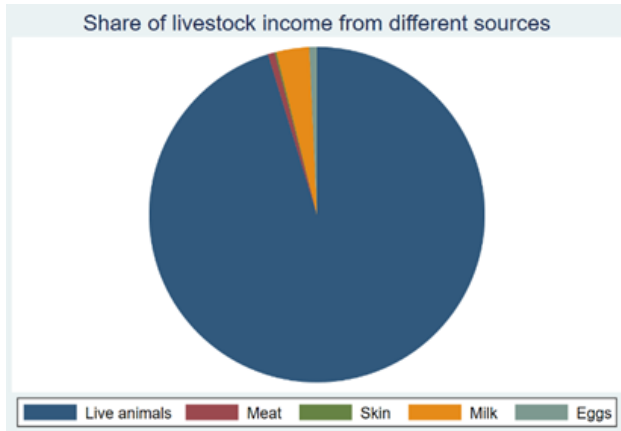
Source: World Bank staff calculation based on EHCVM 2018/10.

Figure 39. The composition of animal sold varies by region.

% of animals sold, by region

Agadez   Diffa
Dosso   Maradi
Tahoua   Tillaberi
Zinder
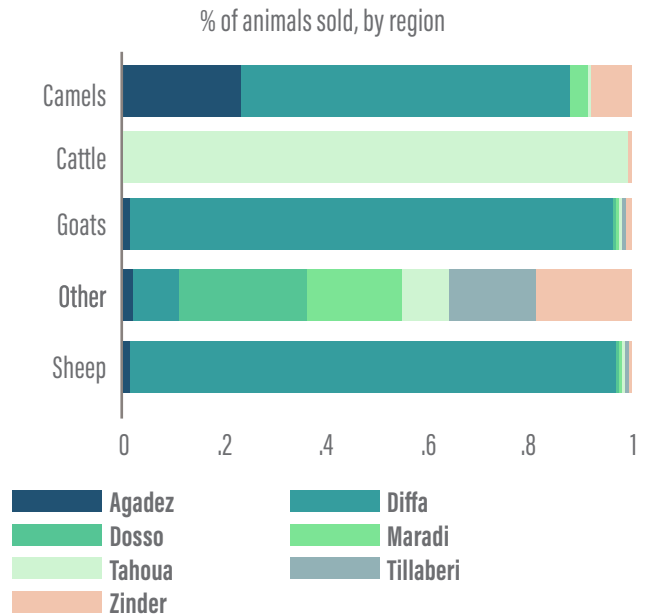
Figure 40. Trade, mining, and industry are three major sectors contributing to rural income

Distribution of enterprise income by industry, by region

Agriculture, livestock, fishing   Trade
Mining and quarrying   Transport
Industry, electricities, water   Services
Construction   Other
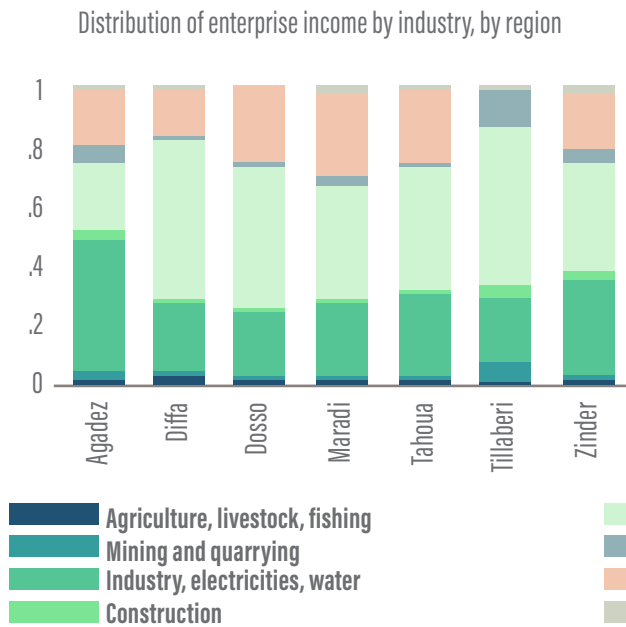
Figure 41. The poorest tend to participate in non-farm enterprises in trade and services more than the richest.

Distribution of enterprise income by industry, by consumption quintile

Source : World Bank staff calculation from EHCVM 2018/19.
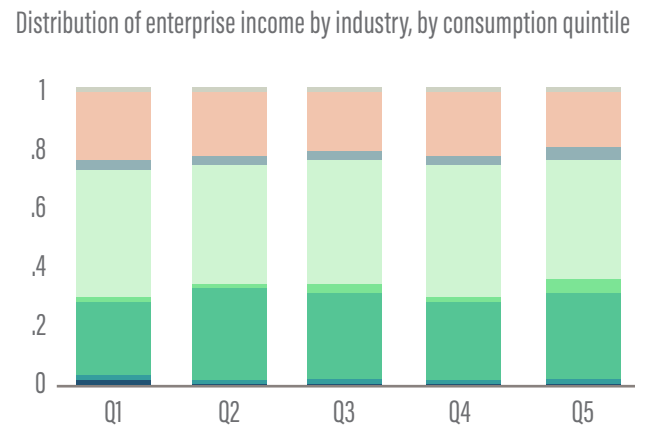
Relatively speaking, remittances represent a smaller part of income, but still significant in rural areas. In 2019, about a third of poor households received either domestic or international remittances. Rural poor are less likely to receive domestic remittances than their counterparts in urban areas (Figure 41), but they have a higher probability to receive international remittances (Figure 42). It is expected that international remittances contribute more significantly to household income. Among poor recipients, about a third of their total income derives from money sent by members living abroad (Figure 43). Meanwhile, transfers from domestic migrant accounts for only a fifth of the income of poor households (Figure 44).

Figure 42. Rural poor are less likely to receive domestic remittances...
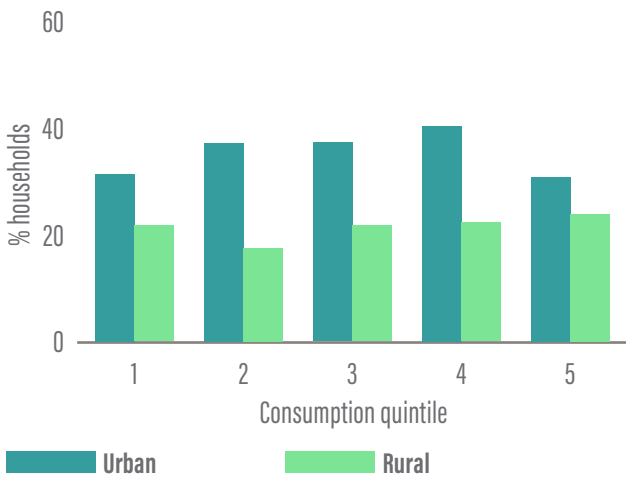
Figure 43. But they have a higher probability to receive international remittances...
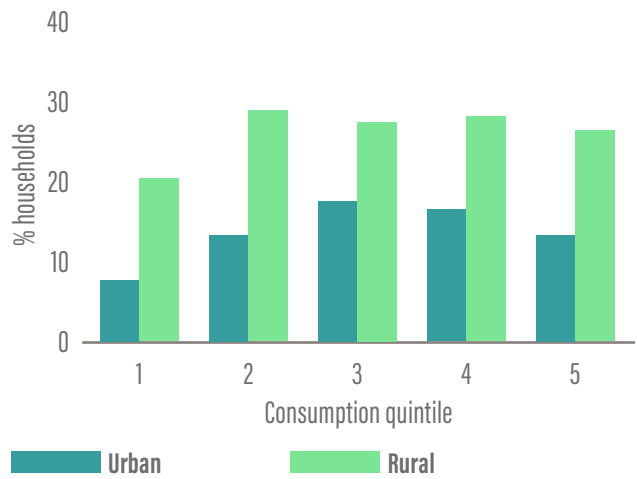
Figure 44. Domestic remittances contribute to a fifth of poor recipients' household income...
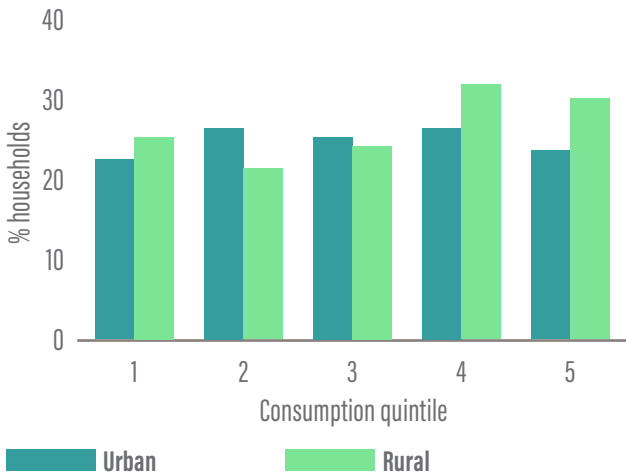
Figure 45... while this ratio is a third for international remittances
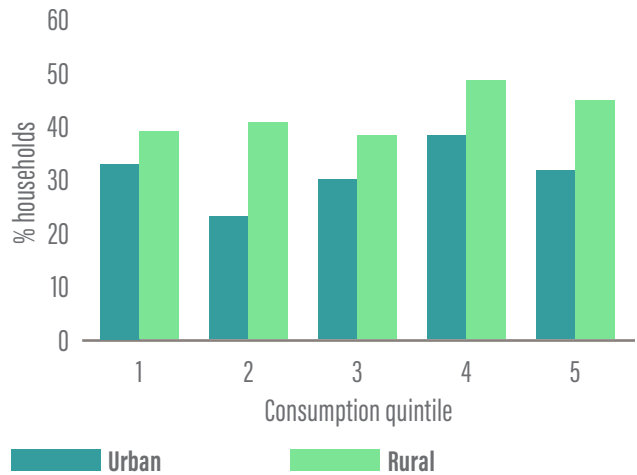
Source: World Bank staff calculation from EHCVM 2018/19

Gender differences in income are substantial. Women are less likely to join the labor force and work for pay. Even when they do work, they are more likely to work part-time or in the informal sector. Time use constraints related to social norms, including the burden of domestic chores, also play a role in constraining women's ability to work. All this leads to substantial gender gaps in income and productivity. Over half of the income from female-headed households come from remittance. Income share from farming is 24% and 42% for female- and male-headed households, respectively. Female-headed households have smaller land and own less livestock. Enterprises owned by women show 61 percent lower profits than those owned by men[6]. Gaps are also large for wage earners. The gender gap in earnings is estimated at 29 percent when comparing similar male and female workers.

The reliance on agriculture, combined with one main harvest season, results in strong seasonality in rural labor demand, income, and prices (Mortar and Tristian, 2005). This pattern generates highly seasonal consumption, with consequences for nutrition outcomes, particularly for poor households. Indeed, the proportion of households with low dietary diversity declines by nearly half during the harvest season (Somes and Jones, 2018).

2.1.2. HUMAN CAPITAL ASSET AND PRODUCTIVITY ARE LOW

Across regions, human capital outcomes are very low, for both bottom 40 percent and the rest of households. In 2018, Niger ranks 155th out of 157 countries on the World Bank's Human Capital Index, falling well below the low-income and regional averages. The country's performance on educational indicators is particularly weak (See chapter 4 for more details).

Niger also has the highest fertility rates in the world. Average births per woman have been 7 from 2016-2018, compared to 4.8 in SSA region and 4.6 in low income countries in 2017 (World Development Indicator 2019). The average age of first marriage for female is 16.7. This early average age of marriage and first birth as well as the high fertility rate increase health risks for women, while reducing the amount of time they have to fully participate in economic opportunities.

Land holdings are large, but informal. Based on data from EHCVM 2018/19, almost all households have access to land, and the average size of land owned is 3.4 hectares and relatively equitably distributed between the bottom 40 and upper 60 percent of the consumption distribution (Figure 46). However, formal land ownership is very limited. With 80 percent of the cultivated land are owned, only 0.8 percent have titles. The land rental market is close to nonexistent. According to (Deininger, Savastano, & Xia, 2017), 7 percent of households in Niger rent land, among which 25 percent being landless. Land rental allows the land poor to access land. The fact that land holding varies little between poor and non-poor, suggesting that the size of land holdings is not a driver of income inequality. Only 5 percent of the 270,000 hectares of land with irrigation potential in Niger is equipped to provide water to crops (AQUASTAT, 2019).

Households own a large number of animals, 12 on average. Livestock are the main asset and factor determining food security and poverty reduction in agropastoral and pastoral livelihood zones in Niger (FEWS, 2017) and 95 percent of rural households own some types of animals. Ruminants (cattle, sheep, goat, camels, horse, etc.) form the majority of livestock owned by rural households, followed by poultry (chicken and duck, etc.) across all wealth groups. According to FEWS NET (2017), The average national livestock herd size in Niger between 2010–2014 included 10.3 million cattle, 10.6 million sheep, and 13.9 million goats. Almost all regions in Niger have substantial stocks, except the urban capital district and the desert Agadez Region. Tillabéri, Zinder, Tahoua, and Maradi Regions are the livestock powerhouses, accounting for close to 80 percent of the cattle and small ruminant population, while Diffa and Dosso Regions have a lower but still significant share (Figure 42). Almost all of the livestock in Agadez region are ruminants.

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6   Economic Impacts of Gender Inequality in Niger (2018)

Figure 46. Land size is equitable distributed between the bottom 40 and upper 60 percent of the consumption distribution.

Average size of land owned (hectares), by region

Top 60%
Bottom 40%
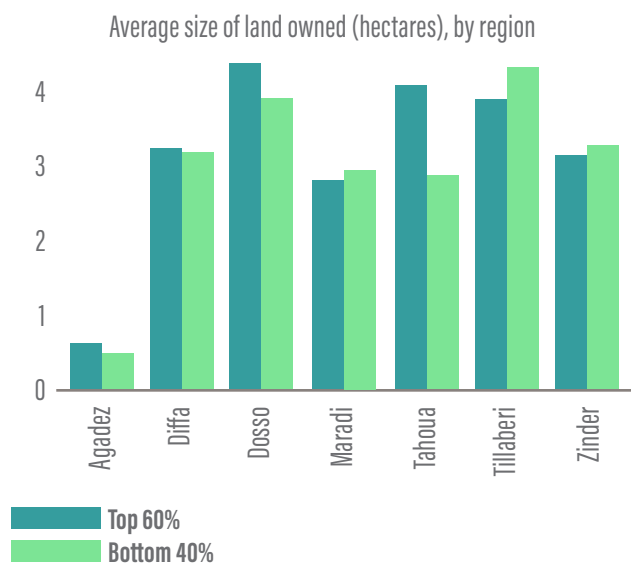
Source: World Bank staff calculation from EHCVM 2018/19

Figure 47. Agadez and Diffa regions have the highest number of cattle and small ruminants while poultry is raised in other regions.

Number of livestock, by region

No. of poultry
No. of ruminants
No. of non-ruminants
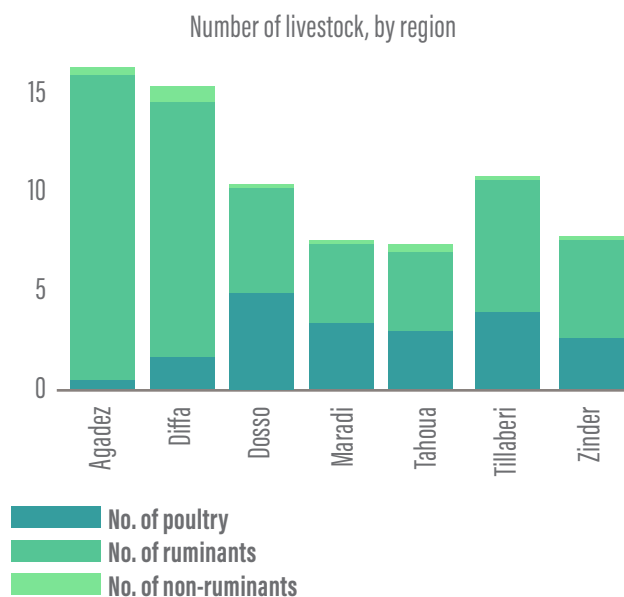
2.1.3. ACCESS TO MARKETS AND FINANCIAL SERVICES IS LIMITED

Most households have poor access to domestic and international markets. As a landlocked country, Niger must rely on land, air, or river transportation to reach its principle, non-African trading partners , specifically, the European Union. Niger's nearest port, Cotonou, Benin, is located at a distance of 1,050 kilometers from Niamey, which impacts the country's access to international markets. The country is also sparsely populated and ranks low on road density and market accessibility indices relative to other low-income countries. According to the Logistics Performance Index, Niger ranked 100 in 2016 and 157 in 2018, presenting a deteriorated logistics environment. This makes accessing domestic markets challenging. As mentioned in Chapter 1, electricity access is also very poor, while digital connectivity is slightly improving.

Input use—fertilizer, improved seeds—is very low. While it has been empirically proven in the literature that increasing the use of fertilizer could foster productivity growth and increase agricultural income among poor households (see Larson 2016), the rate of input use is low in Niger. About 22 percent of households in the top quintile of the consumption distribution use inorganic fertilizer, while only a little over 10 percent of the bottom 40 percent households use it. By comparison, the proportion of households using fertilizer rose from 38 percent in 2009/10 to 48 percent in 2011/12 in Niger (Theriault, Smale, & Haider, 2018). Use of pesticide is higher among rich households and Agadez and Diffa regions.

Commercialization rates are also very low. On average, Nigerien farmers sell 17.5% of their production on the market: 3.8% of Millet, 3.2% of Sorghum, and 27% of Paddy Rice. The portion is lower in poor households (Figure 48). For comparison, the corresponding values are 31, 42 and 39 percent for Niger, Ugandan and Malawian farmers, respectively.

Figure 48. Commercialization rate is low in Niger
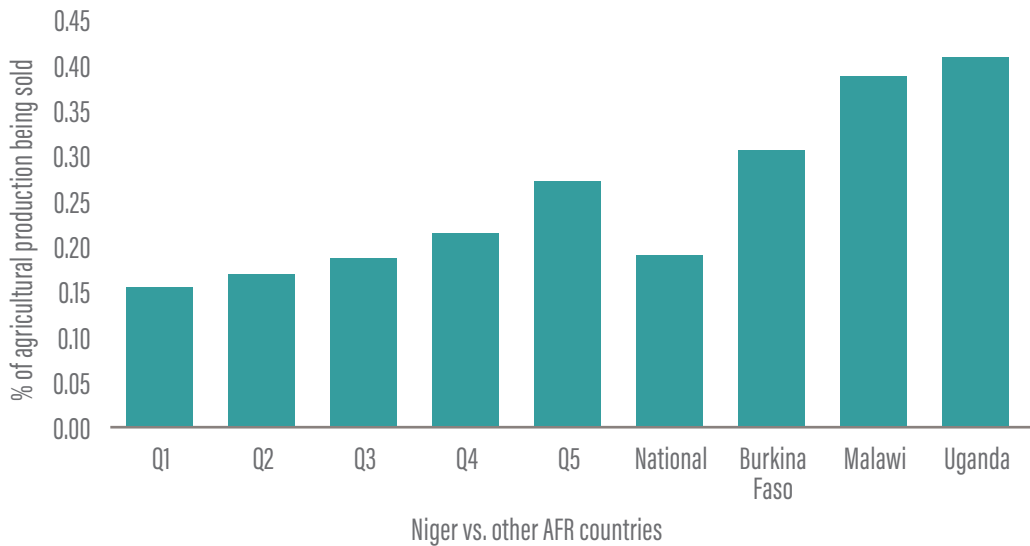
Source: World Bank staff calculation based on EHCVM 2018/19 and MAFAP 2017

Rural financial services are limited. As discussed in chapter 1, only 6 percent of the poorest 40 percent of the population have a bank account. In addition, households capacity to borrow or to save has declined significantly over time (FINDEX 2014-2017). However, access to mobile banking has increased slightly and signaled an encouraging trend.

Strong norms of mutual assistance help households cope with shocks, but public safety nets or private insurance markets are largely absent, outside of small pilots. Households primarily cope with shocks by helping each other though remittances, gifts, and transfers. Norms of mutual assistance are strong.

2.2. Opportunities for Nigerien rural income growth

The predominance of agriculture in incomes and the slow pace of transition mean that opportunities for income growth in the immediate term are largely in agriculture, particularly if commercialization and diversification are encouraged. Growth in rural non-farm work offers some opportunities, mostly from mining sector. The need for faster structural transformation requires increasing emphasis on rural to urban migration.

2.2.1. THERE IS A POTENTIAL FOR INCREASING PRODUCTIVITY OF EXISTING CROPS

Crop production could increase from cultivated land expansion but it should be expanded through land restoration to avoid converting pasture or forest land to crop production. The country is endowed with 47 million ha of agriculture land in 2016, of which about 11 million hectares are currently under cereal cultivation (World Development Indicator 2019), the remaining agriculture land is non-cereal cultivation and pasture. In addition, about 1 million hectares are currently forested. The constraint to how much land a household farms is often not the amount of land that there is, but the amount of land that can be farmed with the labor available during peak production periods. Adoption of mechanization could increase the area farmed. Increases in cropped area in the past have in part come

with a reduction in forest area. Increases in land to crop production may not be optimal if they come at the expense of reductions in pasture or forests given the income that can be derived from livestock and forest products, and the climate benefits from forest cover.

Land productivity varies little across regions. On average, land and labor productivity is very low among its comparable countries (Table 8). In 2014, the land productivity is $77/ha, compared with $222/ha in Burkina Faso, $101/ha in Mali, and an average of $322/ha in sub-Saharan Africa. Within the country, however, little regional heterogeneity is found. Productivities vary little across zones and are almost the same across crops, except paddy rice and onion. The two most exported crops have higher land productivity than other crops (Figure 50).

Table 8. Productivity trend

Country/Region	Land productivity (in constant 2004–2006 US$)				Labor productivity (in constant 2004–2006 US$)			
	1990	2000	2010	2014	1990	2000	2010	2014
Sub-Saharan Africa	198	255	321	332	1,326	1,597	1,885	2,105
Burkina Faso	111	146	196	222	297	296	388	378
Mali	44	51	95	101	822	885	1,345	1,347
Niger	35	51	74	77	500	545	793	711
Senegal	111	147	198	178	374	397	428	314
Uganda	382	433	454	434	584	588	517	421
Ethiopia	99	145	250	286	255	218	300	315

Source: World Bank (2020).

Figure 49. Only a quarter of agricultural land is currently used for cereal production.
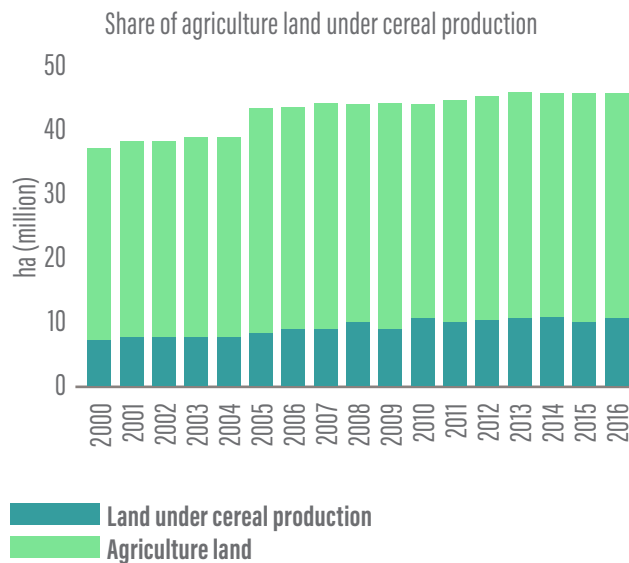
Share of agriculture land under cereal production

Source : World Bank staff calculation from World Development Indicator 2019.

Figure 50. Land productivity varies little across regions.

Land productivity (FCFA/Ha; log), by region

Source: World Bank staff calculation from EHCVM 2018/19

Yield potential is low compared to its peers, but potential improvement with irrigation and technlogogy exists. Niger's average cereal yield is among the lowest in the region (World Bank, 2016). The national average yield in Niger for rain-fed pearl millet is 0.53 metric tons per hectare, with a yield potential of 1.18 MT/ha without irrigation. With irrigation, the potential increase signficantly to 4.03 MT/ha. For sorghum, the national average yield is 0.35 MT/ha, with a rain-fed potential of 3.3 MT/ha and an irrigated potential of 5.62 MT/ha (GYGA, 2016). With low yields, farm sizes need to be large to provide enough income. This highlights the potential for increasing labor productivity through mechanization. Technological innovation can also increase long-term yield potential, and there is a particular need to develop seeds that take into account increasing variability in the timing of rain during the growing season; the labor constraints farmers face at peak production times; and low levels of education. Investments in research and development (R&D) would have payoffs in the long run rather than in the next 5-10 years, as there is little availability of improved cultivars in sorghum and millet, which are the main staple crops in Niger. Other opportunities for income growth in Agadez and Dosso regions, such as the development of livestock value chains (discussed below) or even rural-to-urban migration, appear more attainable in the medium run and may also be a more cost-effective long-run development strategy.

Investments in natural resource management and improved production practices can also increase yields. Investing in improving soil quality will also increase yields (Naab, Mahama, Yahaya, & Prasad, 2017). Increase household access to plough and improved technologies can provide room for increasing labor productivity (Mahajan, 2019) (Murray, Gebremedhin, Brychkova, & Spillane, 2016). The previous section also indicates that there is room to increase investments in fertilizer and pesticide.

2.2.2. GREATER COMMERCIALIZATION CAN GROW INCOMES AND INCENTIVIZE INVESTMENTS

At the national level, Niger consumes most of what it produces, and at household level, Nigeriens consume most of what they produce as well. Nearly all the cereals produced are consumed domestically. Except for rice, very little cereal is imported (Figure 51), making Niger largely self-sufficient in cereals. In fact, Niger has one of the highest self-sufficiency ration in Africa (Figure 52). This self-sufficiency ratio at the national level is matched at the household level as much of the food produced by Nigerien households is consumed by the households that produce it.

Figure 51. Except for rice, very little cereal is imported.

Niger: Evolution of cereal imports - tons (1980-2017)
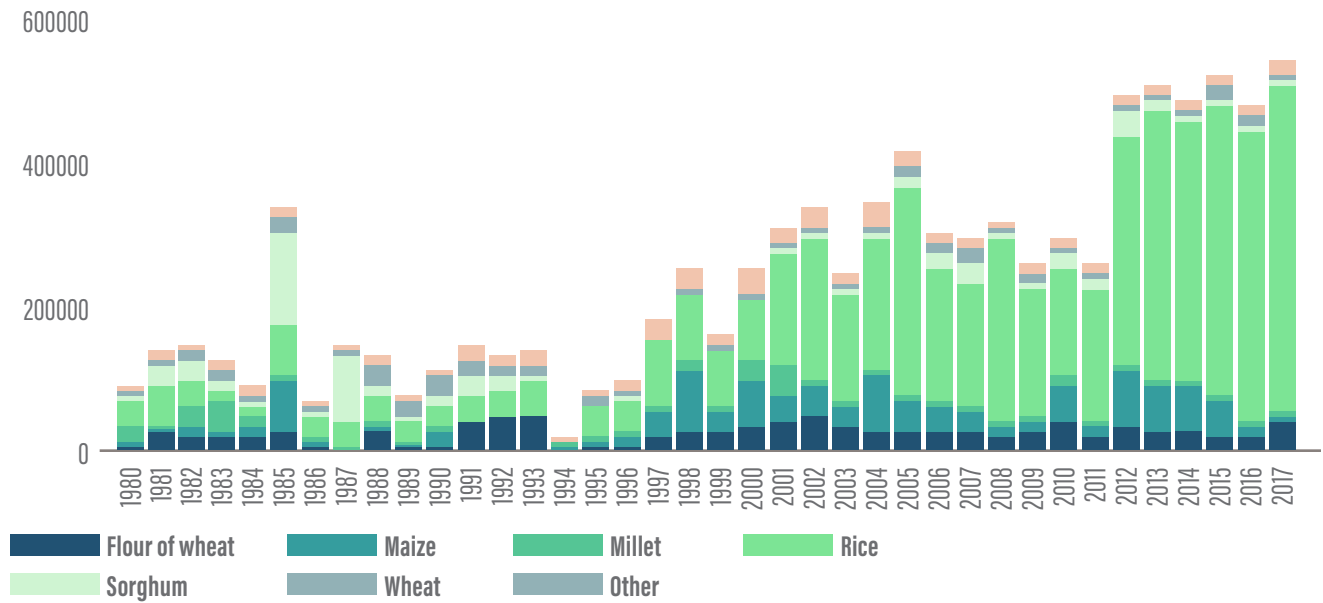
Source: World Bank staff calculation based on FAOSTAT.

Figure 52. Self-sufficiency ratio is higher in Niger than in its peers, except Mali.
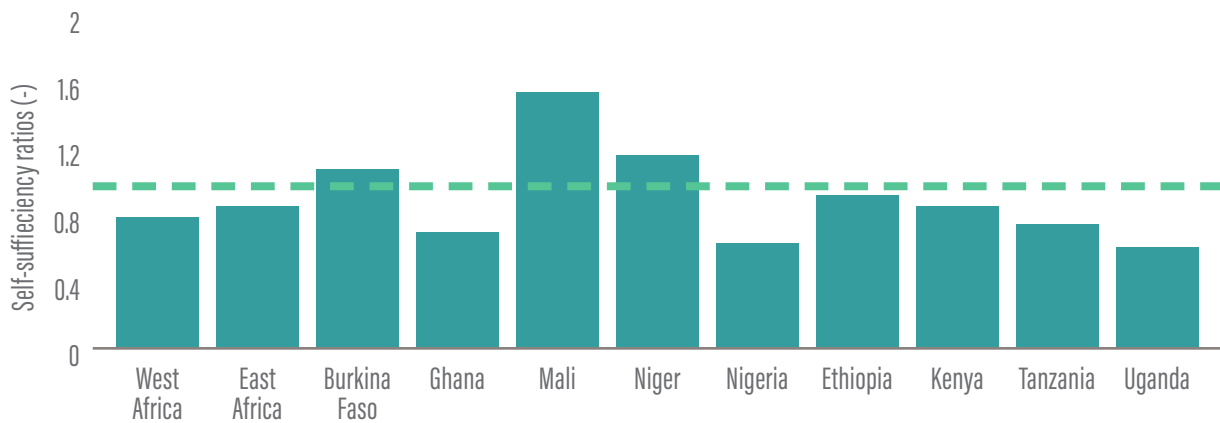
Source: (van Ittersum, 2016)

Without commercialization, households have little incentive for increasing production within the existing crop mix. As shown in Chapter 1, 13 percent of Nigerien population are food insecure and would gain from production increases. Increasing food production is particularly important in Zinder, Maradi, Dosso, and Tillaberi regions where food insecurity rate is the highest. On average, demand analysis shows that among rural households only 5-15 percent of increases in crop production would be consumed within the household (Figure 53).

When households can sell their production in the market, their investments are higher. There is a strong correlation between market access and households' investments in inputs. Input use increases with commercialization and access to markets more than with income (World Bank 2020). An important question is whether market access can incentivize higher rates of investment or whether high rates of investment in production allow households to better access markets. It is also possible that both need to happen simultaneously. Recent experimental evidence comes from Benin and Senegal, where market incentives were increased while other variables stayed equal. Results show that, when contracts secure the market (Benin) or grading provides incentives for quality (Senegal), farmers respond by increasing investment (see Arouna et al. 2019 and Bernard et al 2018). In addition, stakeholder discussions underscored that output market access had been a key component of successful interventions to increase production. In contrast, some projects that focused on increasing crop production with no attention to marketing saw local prices collapse and production remain unsold, dissuading farmer investments the following season. Although constraints to market access and productive investments often need to be addressed at the same time, there is some evidence that addressing market access first can allow some households to also invest more and increase their incomes.

Figure 53. Marginal food budget shares in rural and urban areas
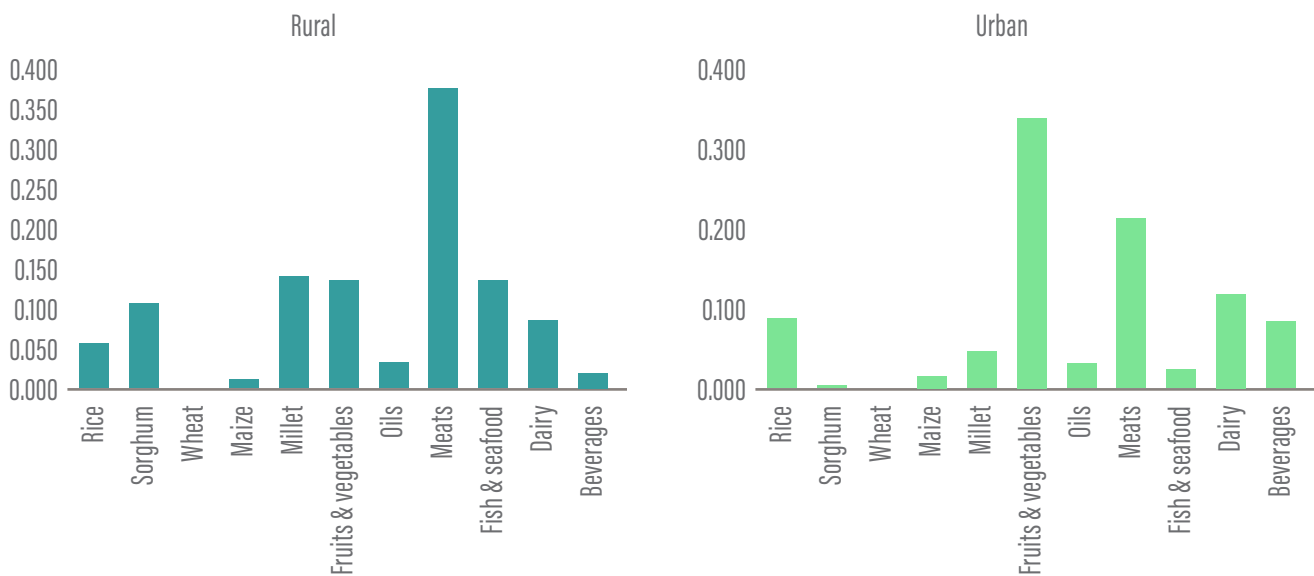
Source: World Bank staff calculation based on EHCVM 2018/19

2.2.3. COMMERCIALIZATION GOES HAND IN HAND WITH DIVERSIFICATION

Commercialization will require diversification into animal products and new crops, as the demand for domestically produced cereals—sorghum and millet—is limited. Demand analysis undertaken for this diagnostic shows that urban households primarily consume imported cereals—rice—not much domestically produced ones (millet and sorghum). As a result, urban growth (be it driven by population growth or income growth) does not result in higher demand for domestically produced cereals (Figure 48). In contrast, urban growth increases consumption of animal products and fruit, and vegetables. The more households increase their commercial production of these goods, the more the domestic demand for cereals may increase (as those rural households may start purchasing cereals, if their food consumption preferences do not change), but diversification is needed first.

An export-oriented agricultural growth strategy is possible as Niger is surrounded by countries with which it trades. Like other Sahel countries, Niger has a revealed comparative advantage in groundnuts, millet, sorghum, rice, fruits, even at current yields and costs of transacting. It is also shown that the country has a natural comparative advantage for the production of cattle and small ruminants for export to the coastal countries of the Gulf of Guinea and Central Africa (OECD 2008). Regional demand for livestock products continues to grow. Given the small size of the domestic market, a focus on products where there is also comparative advantage may make most sense in the long run.

Diversification also requires cereal market development; the two need to go together. Lack of cereal market development raises the cost of consuming purchased goods in rural areas and results in substantial price volatility. This makes growing crops for sale and purchasing food for consumption both costly and risky (Fafchamps 1992).

2.2.4. GROWING LIVESTOCK INCOME HOLDS PROMISE

The growing demand for animal-based food provides an important opportunity for a profound transformation of the livestock sector and a strong incentive to maximize livestock income growth potential. In the next 30 years, overall consumption of all animal products is estimated to double. Demand for beef, poultry, and pork can even be triple (Error! Reference source not found.). In 2010, the total supply of livestock-derived food (LDF) in Niger was 192 kcal per person per day. Dairy accounted for 48 percent of the supply while meat was 52 percent and eggs less than 1 percent. Within meat category, beef had the highest share, at 70 percent of meat supply followed by lamb at 26 percent. Under the scenario of moderate economic growth, total supply of LDF increases to 268 kcal in 2030 and to 442 kcal in 2050. By 2050, the share of dairy is projected to reduce to 35 percent while the share of meat, mostly beef, will increase to 64 percent of all LDF supply. According to (Enahoro, Njiru, Thornton, & Staal, 2019), production of beef and dairy products will not be sufficient to supply the domestic market in the near future. By 2050, dairy production can only meet less than half of the domestic demand (Table 9).

Table 9. Projection of demand for different livestock-derived food types in Niger

	2010	2030	2050
	kilocalories per capita per day (% of total supply)		
Beef	69.57	114.63	219.81
Pork	1.14	1.93	3.88
Lamb	25.30	33.15	49.32
Poultry	3.13	5.46	11.24
Dairy	91.66	111.82	155.69
Eggs	1.31	1.73	2.59
All meat	99.13	155.17	284.25
All LDFs	192.10	268.72	442.54

Source: (Enahoro, Njiru, Thornton, & Staal, 2019)
IMPACT model results for moderate economic growth, no climate change (Middle No CC) scenario.

Figure 54. Model projections of production and demand in Niger

National demand and production of Beef in 2010 (reference, A) and 2050 (various scenarios, B-P)

National demand and production of Dairy in 2010 (reference, A) and 2050 (various scenarios, B-P)
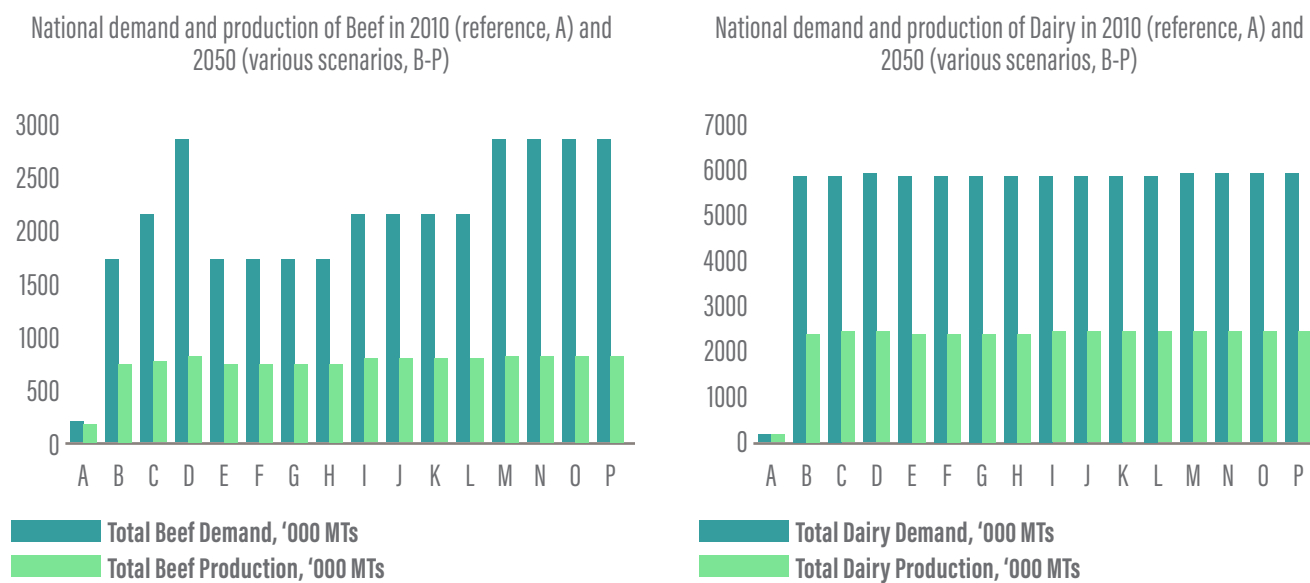
Source : World Bank staff calculation from World Development Indicator 2019.

In addition, Niger plays a critical role as a major livestock exporter to neighboring countries. Niger has the highest herd population in the Sahel region, with an estimated 11.4 million heads of cattle by 2014. The main animal breeds kept in Niger are: Cattle, goats, sheep, camels and horses. The majority of exported livestock goes to Nigeria, through principal entry points that follow major roads and rivers, even though animals are often trekked across borders to avoid formal customs procedures. Niger's large wholesale markets are located along the border with Nigeria, from where supply is transported to export markets in northern Nigeria, like Jibia and to consumption markets in southern Nigeria such as Lagos, Ilorin, Ibadan, Port-Harcourt. Livestock exports to Nigeria account for more than 90 percent of overall livestock exports,98 with Ghana and Cote d'Ivoire as other key consumers of Nigerien livestock, especially small ruminants. Traders from Nigeria purchase animals in Niger when selling cereal on local Nigerien markets. Therefore, changes or shocks to this symbiotic relationship between Nigerien and Nigerian traders can disrupt normal cereal supply systems (FEWSNET).

As regional demand continues to grow, Nigerien livestock producers will have access to an even larger market. Estimated demand for poultry in West Africa could triple to reach approximately 14 million tons by 2050. Similarly, demand for beef and small ruminant meat could increase up to 50 percent to nearly 4 million tons. In a normal development progress of trade as today, the regional production will supply less than half of the demand for poultry and about 20 percent less for beef and ruminants.

The incentive for increasing livestock production is clear, but production growth must not only come from an increase in cattle stock but also from improvement of productivity technologies. Using the same historical growth rate of the past two decades, the stocks of all livestock is estimated to triple in the next 30 years. As mentioned above, a larger animal population is needed, although this will increase pressure on natural resources and pose more challenges to the environment and human health. Therefore, it is increasingly more important to invest in livestock productivity, which could be realized through livestock genetic improvement, animal nutrition, zoonotic disease control, and supporting policies.

2.2.5. RURAL NON-AGRICULTURAL INCOME GROWTH WILL PRIMARILY COME FROM MINING AND MIGRATION

The prospects for growth in non-farm, non-tradable services are weak across the country. Low population density limits demand for non-tradable rural services such as restaurants and hair-dressers, even if spending power were to increase through a growth in agricultural income. The exception is Niamey, with higher population.

Mining has potential to increase non-farm incomes, if production practices improve. Mining brings direct job benefits and also indirect benefits, as it increases demand for goods and services around mining sites. Industrial mining accounts for a larger share of economic output (more than half of Nigerien exports in 2018), but employment in the artisanal and small-scale mining sites is much higher, and it brings bigger welfare benefits: areas around artisanal and small-scale mining sites have seen significantly faster consumption growth than areas without mining (Bazillier and Girard 2017). As of now, over 450,000 Nigeriens working in these operations, and more than 20 percent of them depends on mining as an important income source (UNECA 2019). However, for artisanal mining to reach its potential to sustainably improve the well-being of the rural poor, the mode of production currently used will need to change. There is also robust evidence of a negative correlation between proximity to mining sites and school enrollment, as income today is preferred over investments in human capital that will increase income-earning potential tomorrow (Stoeffler Q. and C. Guirkinger 2019).

Remittances are an important source of income, particularly for male youth who are those most likely to migrate, but at current trends the potential for growth in migration looks weak. Networks are a strong driver of migration, and with a large regional network it is likely that regional migration will continue to be important (see De Brauw et al 2014, Wouterse 2012, and Meghir et al 2019). However, rates of regional migration have been declining over the past two decades. Migration from rural to urban areas is currently too low in Niger to be a pathway for income growth for many rural households. Faster job creation in urban spaces is needed to encourage faster rural to urban migration. Growth in formal jobs in urban areas has been 3.7 percent per year over the last five years, not much higher than population growth.

2.3. Conclusion

The agriculture sector, including farming and livestock, continues to be the largest income sources for rural households in Niger. Building on existing data, this chapter provided a detailed diagnostic of rural income growth in Niger. In Niger, 95 percent of the poor live in rural areas. Therefore, understanding rural income sources will provide important insight for the design of poverty alleviating reforms and programs. It is estimated that 75 percent of Niger's workforce is employed in farming and livestock activities. Productivity is very low, due to several constraints, including limited access to productive and modern inputs, limited mechanization, limited diversification, negatives shocks related to global warming, reliance on rainfall. Access to market is also a big issue, with poor households having limited access to domestic and international markets. As a consequence, commercialization is low, most households just produce for their own consumption. Farmers are also struggling to access financial market. Land holdings are large, but informal. A land reform is needed to solve this problem, and if possible, address the important issue of landless.

Improvement of the rural income and prospects for a sustainable economic transformation will involve ambitious agriculture and rural economy reforms. These reforms should help tackle all the major constraints, including improving access to land, technology, markets, and finance. Farmers should also be guided to move from low value crops to high value crops. Currently, Niger, and most Sub-Saharan African countries are struggling to meet their food needs, resulting in the use of substantial resources to import food. The country ambitious should be to reform the agricultural sector so as to reduce this dependance on imports, but more importantly, with improved productivity, Niger can generate important income by boosting its exports of food products, including in the regional market. The need for faster structural transformation requires increasing emphasis on rural to urban migration. But to be successful, migrant must be endowed with minimum skill.

3 COMPOUND EFFECTS OF SHOCKS ON WELFARE

The reliance on rainfed crop and livestock production results in high levels of income risk. About 40 percent of Nigerien households reported experiencing a shock, either covariate or idiosyncratic shocks[7], in the past 3 years. Assessing vulnerability in different households is important as it provides policymakers with guidance on how to efficiently allocate resources to prevent households from falling into poverty.

While health shocks and high food prices are widespread across Niger, all other shocks are quite localized (Table 10). On average, one in every four Nigeriens experienced a health shock, defined as illness or death of a household member, over the past 3 years. However, the prevalence is highest in Tillaberi, Maradi, and Tahoua regions. Similarly, households across region experienced high food prices, but the situation is most acute in Tillaberi region where more than half of the population are net food buyers. However,

shocks such as conflict, natural hazard, crop and animal diseases concentrate in certain regions only. For example, conflict is felt the most in Diffa region, while draughts are particularly reported in Tillaberi and Tahoua regions with more than 40 percent of the population affected, and flood is reported mainly in Dosso and Agadez regions. During this period, crop diseases attack Zinder region, and animal diseases spread across Agadez, Diffa, and Dosso regions.

At national level, the most important shocks Nigerien households face are natural hazards, health shocks, high food prices, and insecurity. As commercialization rate and fertilizer input for agricultural production are extremely low (see chapter 2), it is expected that very few households reported decline in agricultural product prices and increase in agricultural input prices as household shocks. This chapter aims to explore these most commonly reported shocks in Niger and their impacts on Nigerien welfare.

Table 10. Type of shocks by region

	% of population affected							
	Illness/Death of a household member	Draught	Flood	Crop diseases	Animal diseases	High food prices	Violence/ conflict	Locus attack
Agadez	25%	4%	**17%**	2%	**15%**	11%	1%	0%
Diffa	18%	20%	4%	2%	**11%**	15%	**32%**	**10%**
Dosso	25%	32%	**22%**	3%	**12%**	10%	0%	6%
Maradi	**29%**	22%	5%	8%	8%	8%	1%	3%
Tahoua	**29%**	**42%**	4%	8%	4%	12%	0%	8%
Tillaberi	**32%**	**43%**	6%	8%	7%	**21%**	1%	4%
Zinder	15%	28%	4%	**12%**	7%	8%	0%	**10%**
Niamey	27%	1%	5%	0%	0%	11%	0%	0%

Source: World Bank staff calculation based on EHCVM 2018/19
Note: The low prevalence of violence in Tillabéri and Tahoua regions is surprising. This likely reflect the fact that administrative data (Such as ACLED) are more precise in capture conflicts vs standard households surveys.

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7   Covariate shocks affect many households in one place at the same time, like drought, conflict, and price shocks., and idiosyncratic shocks affect individual households rather than the whole community like loss of job, death or illness of family member, and divorce.

3.1. Main Shocks to Welfare

3.1.1. DROUGHT IS THE MOST FREQUENTLY REPORTED SHOCK

Natural hazards such as drought or flash floods pose major challenges to Nigerien agricultural production, including both farming and livestock rearing. Niger is one of the hottest countries in the world. It has three basic climatic zones: the Saharan desert in the north, the Sahel to the south of the desert, and the Sudan in the southwest corner. The intense heat of the Saharan zone often causes the scant rainfall to evaporate before it hits the ground. Moreover, the rainy season is very short, typically during a single two-month period. Thus, a decline in rain level could have serious effects on households production. In fact, the severe drought in 2011 pushed nearly half of Nigerien

population in high food insecurity because of the loss of crops and livestock. Seasonal flooding is another challenge. Flash floods in 2019, particularly in Agadez, Diffa, Maradi, and Zinder, have affected over 259,000 people and resulted in the disruption of livelihoods and loss of livestock.

Drought is the most frequently reported shock that Nigeriens face. According to EHCVM 2018/19 data, 35 percent of the rural population and 4 percent of the urban population reported drought as a key shock in the past 3 years (Figure 55). This is consistent with the CHIRPS data, which shows poor precipitation level in 2017 (Figure 56). The lowest rainfall level in 2011 in Figure 56 corresponds to the 2011 Sahel drought, when Niger's crops failed to mature in the heat and resulted in famine.

Figure 55. Drought is most frequently reported
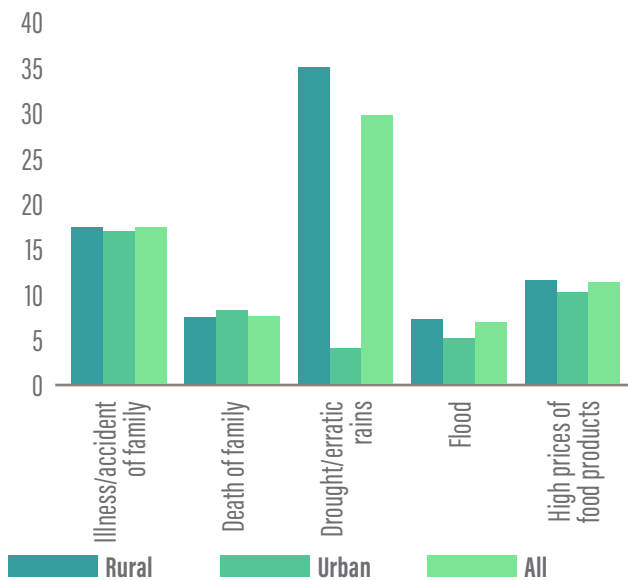
Source: World Bank staff calculation based on EHCVM 2018/19

Figure 56. Total rainfall is poor in 2017

Total rainfall (mm)
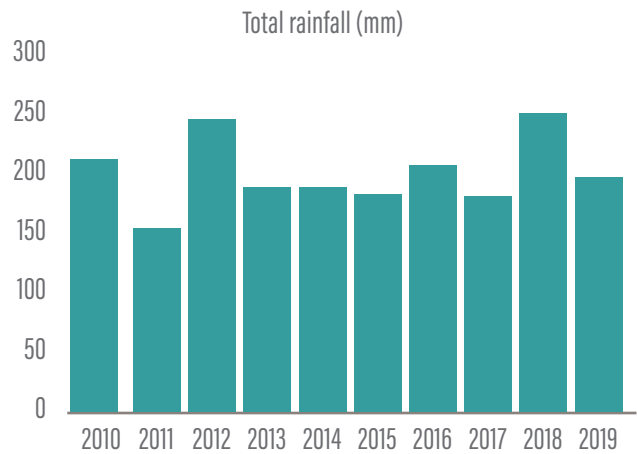
Source: CHIRP 2019.

Figure 57. Poor rainfall in the north makes agriculture households vulnerable
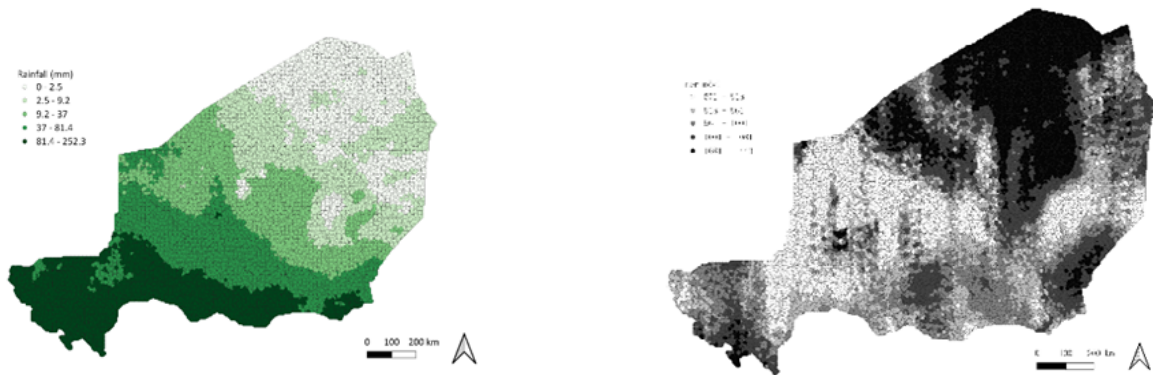
Source: World Bank staff calculation using CHIRPS and NDVI

Low precipitation level in the north makes households more vulnerable. Figure 57 shows the average monthly rainfall and vegetation index in the planting period (June-September) in 2018. It ranges from 2.5mm in the north to 252mm in the south. This is consistent with the finding from household survey data that of those who reported drought/erratic rains shock, over 97 percent are in the five southern regions, where the major food crops are planted. On the other hand, greenness is higher in Agadez region.

But households in the south experienced higher incidences of rain volatility. In Tahoua and Tillaberi regions, more than 40 percent of the population experienced drought compared to 4 percent in their northern peer, Agadez region. As shown in Chapter 2, this pattern could be partially explained by the fact that a relatively larger share of household income in these southern regions was derived from farming and livestock activities (Figure 34) thus making them more vulnerable to climate shocks compared to households in the north.

3.1.2. SECURITY ENVIRONMENT IS WORSEN

Increased violence in bordering regions with Niger, Mali and Nigeria, and intercommunal conflict have caused an unprecedented humanitarian crisis in the Niger along with higher levels of food insecurity and malnutrition. It currently harbors 246,000 refugees and 186,000 displaced persons, primarily in Diffa and Tillabéri and more recently, in Maradi, which is further exacerbating the country's fragility. Security conditions have deteriorated in recent years, particularly in the areas bordering Nigeria, Niger, and Mali, where armed groups have established bases and carry out repeated attacks against the security forces and civilians. If the security situation worsens over time, more people may be at risk of being deprived of employment opportunities and access to basic services, and at risk of falling into poverty.

Conflicts and fatalities concentrate in Diffa and Tillaberi regions (Figure 59). In these two regions, security incidents consist most of violence against civilians and battles with a high number of fatalities. A third of Diffa residents confirmed that they experienced conflicts in the past three years. During the survey period of EHCVM 2018/19, there were 627 and 172 fatalities in Diffa and Tillaberi regions, respectively. At the time of writing of this report (June 30, 2020), these numbers have increased to 900 and 907 respectively.

Figure 58. Security incidents roar
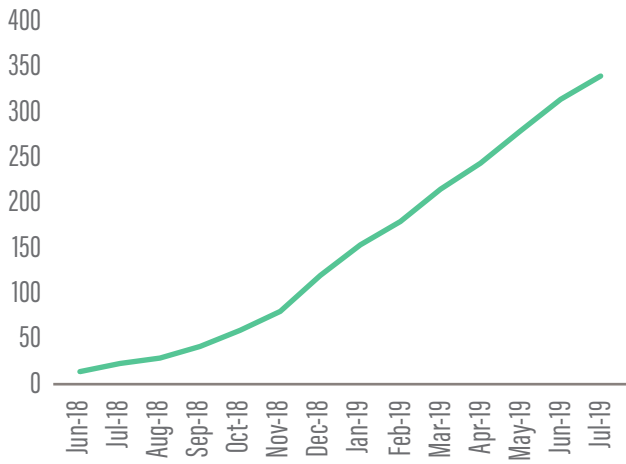
Figure 59. Fatalities concentrate in Diffa and Tillaberi regions.
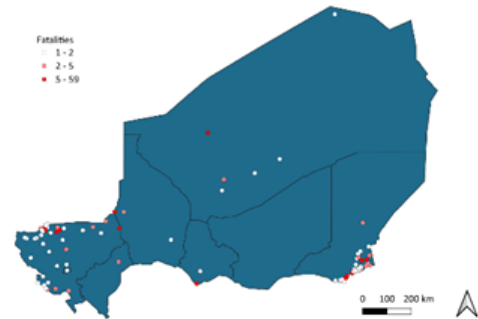
Figure 60. Conflicts in Diffa and Tillaberi regions consist mostly of violence against civilians.

Legend:
- Battles
- Explosions/Remote violence
- Protests
- Riots
- Strategic developments
- Violence against civilians
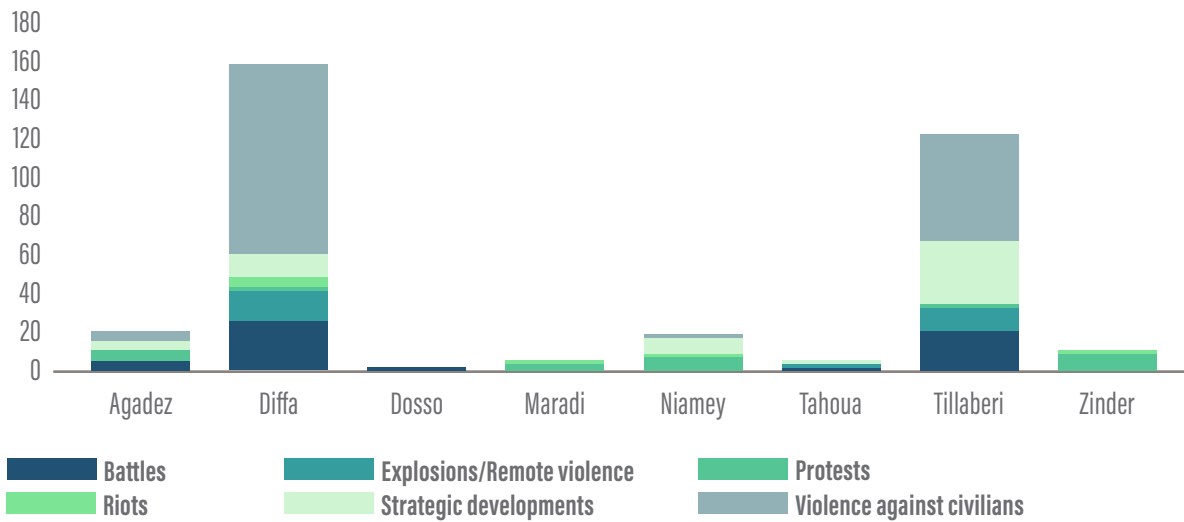
Source : World Bank staff calculation based on ACLED 2019.

3.1.3. HEALTH SHOCK AFFECTS THE POOR POPULATION THE MOST

Health shocks, including the current coronavirus outbreak, could have adverse impacts on household welfare. Illness of a household member can increase the risk of a household becoming destitute if there are significant out-of-pocket (OOP) healthcare expenditures. Although only 55.4 percent of people with illness currently seek health services because most of them opts for self-medication, the household to which a sick individual belongs may still forgo earnings if there are work-days lost by the sick individual or his informal caregivers. If households indeed seek health services, OOP expenditure cost could wipe out at least 4 percent of the poor's income which is already at a vulnerable level. (2018) finds that the poorest households, such as those in Sub-Saharan French-Speaking Africa countries (SSAF) may be the most vulnerable to health shocks. As Figure 55 shows, illness, accident, and death of family members are the most commonly reported idiosyncratic shocks, especially by urban households. A substantial 26 percent of the urban households reported illness and accident of family members as the most serious shocks happened in the past three years. A shock such as death of a family member affected 8 percent of the rural households and 12 percent of the urban households.

While the prevalence of health shock does not vary by poverty status of the households, female-headed households report illness/death of household members as shock more frequently. On the other hand, as men are more involved in production activities, male-headed households report weather shocks more frequently. This may be explained by smaller household size and higher dependency ratio in female-headed households. For households involved in agriculture production, the average household size is 4 in female-headed households and 6 in male-headed households. The dependency ratio is 2.3 and 1.7 in female- and male-headed households, making female-headed households more vulnerable.

3.1.4. PRICE IS ANOTHER IMPORTANT SOURCE OF SHOCKS

High food prices, typically accompanying a plummet in agricultural production due to other covariate shocks such as drought, is another major shock to Nigerien households. As 40 percent of Nigeriens are net food buyers, increase in food prices are likely to have negative impacts on households' welfare. Particularly for the poor net food buyers who often allocate a large budget share on food, food prices could be one of the decisive factors on whether they would be food insecure. However, due to the lack of frequent and detailed food prices, we were not able to quantify the effects of food prices on Nigerien households in this section.

It is, nevertheless, expected that more urban households are affected by food prices than rural households as they are more likely to be net food buyers. Across regions, a higher share of urban population experiencing high food price than rural population (Figure 61). It should be noted that Zinder and Tillaberi regions have very few urban households in the data set, thus, the urban numbers shown here are indicative only.

Figure 61 : Urban households are more likely to be affected by food prices
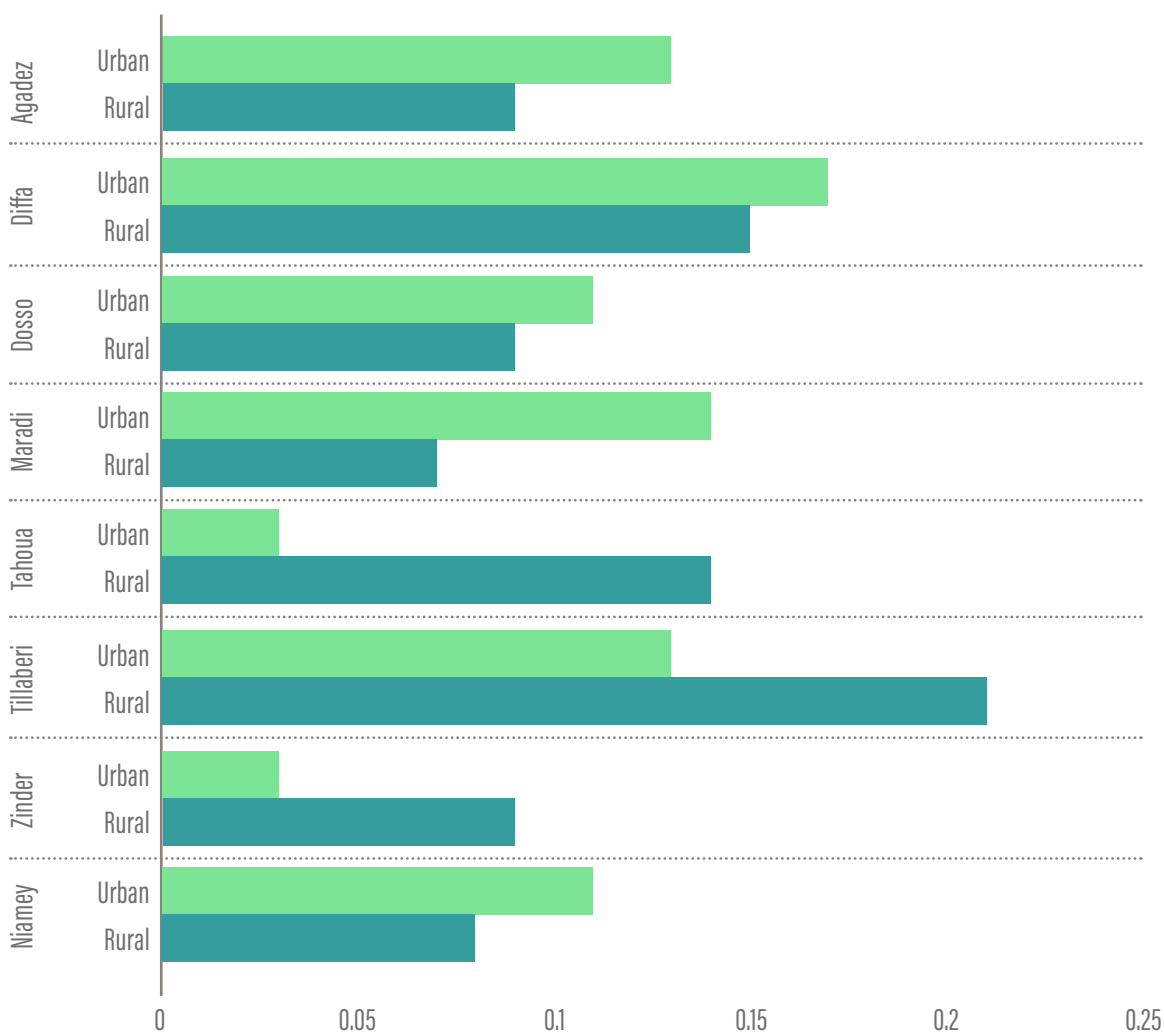
Box 3 : Safety nets in Niger

In Niger, safety nets are mainly divided into food distributions and safety nets for resilience[8]. Food distributions, in the form of targeted distributions or subsidized cereal sales, are short-term and seasonal responses to food crises, targeted to transiently food insecure households. Safety nets for resilience, in the form of cash transfers with accompanying human capital and productive inclusion measures, and cash for work, are long-term and predictable transfers targeted to poor and vulnerable

households. These response mechanisms are respectively managed by the Food Crisis Unit (CCA) and the Safety Net Unit (CFS), established within the National Institution for the Prevention and Management of Food Crisis (DNPGCA[9]).

In Niger, food distributions and safety nets for resilience use different targeting mechanisms. In the first case, transiently food insecure households are geographically targeted based on

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8   Other safety net mechanisms include school feeding programs, subsidized agricultural inputs, nutrition, and health programs.

9   *Dispositif National de Prévention et de Gestion des Crises Alimentaires*. The DNPGCA overall objective is to contribute to improving the resilience of vulnerable groups to climate change, crises and disasters.

the annual Integrated Phase Classification (IPC) (category 3 and 4), while moderately and severely food insecure households are identified through a community-based approach (Household Economy Approach). Programs targeted to the poor and chronically vulnerable (ASNP1, ASNP2) use a mix of geographical targeting and proxy means test (PMT). Geographical allocations are proportional to poverty rates based on the most recent EHCVM (EHCVM 2014 for ASPN1 and the EHCVM 2018 for ASPN2). Extremely poor households are identified through PMT, whose efficiency to identify the poorest was evaluated at 82 per cent. Evidence has shown the appropriateness of these targeting mechanisms, as PMT performs better to identify persistently poor households, while HEA performs better to identify transiently food insecure households[10].

So far, food distribution has been the default response modality used by the Government of Niger to tackle food insecurity. Food distribution coverage fluctuates over time, with peaks in years of crises. In the period 2013-2017, more than 2 million food insecure people were targeted each year with food distributions, also in years classified as normal or good, covering almost 90 per cent of the households classified as food insecure. In the last ten years, three peaks in the number of beneficiaries targeted with general food distributions were registered in 2010 (9 million people), in 2012 (4 million people), and in 2015 (3 million people).

Safety net spending and coverage is characterized by an inefficient program mix between long-term predictable transfers, and shock responses[11]. Even during normal years, when no major crisis strikes, long-term safety net coverage is only one third of shock response coverage. Implementing shock responses in the same areas year after year and targeting the same beneficiaries is an ineffective way to address chronic poverty and the deep causes of recurrent food crises.

The proportion of safety net assistance delivered through cash transfers targeted to the poor has gradually increased with the launch of the Adaptive Safety Net Project (ASNP1). Between 2013 and 2019, the ASNP1 provided cash transfers to 1,088,213 individuals in poor and fragile areas in the eight

regions of Niger. In 2017, 600,000 vulnerable people, including ASNP1 and WFP resilience beneficiaries, received long-term, predictable cash transfers. This represented 6.5 per cent of the Nigerien population living under the poverty line and 10.9 per cent of those living in chronic poverty (PER 2020). In 2018, due to a pipeline break and movement restrictions in some regions, the ASNP1 suffered some implementation delays (ASNP1 ICR 2020). The Second Adaptive Safety net Project (ASNP2), approved in 2019, will cover 156,000 poor households (approx. 1,1 million people) through cash transfers and CFW for resilience by 2026.

Since 2016, the government of Niger and development partners have been supporting development of the foundations of an adaptative social protection system, including the development of a Unified Social Registry (USR) as well as ruled-based mechanisms for scaling up the safety net systems to respond to slow and rapid onset shocks. Led by the DNPGCA, the USR is a key component of an adaptive social protection system, as it provides a unified database of socioeconomic information which can help to select beneficiaries of safety nets programs more accurately. Progress is ongoing to strengthen the institutional, regulatory, and operational framework for the USR. A common database of around 640,000 households (approx. 5.6 million people) was available in 2020, which included more than 210,000 urban households in the context of the short-term response to the COVID-19 pandemic.

In 2020, the national adaptive social protection system has been effectively scaled-up to respond to the economic impact of COVID-19. The ASNP 2 provided emergency cash transfers to 150,000 affected households (approx. 1,050,000 individuals) in urban areas and 250,000 households (approx. 1,750,000 individuals) in rural areas. WFP and UNICEF contributed to this scale up, targeting 120,000 households (approx. 840,000 individuals). The scale-up of the adaptive social protection system allowed for covering about 65 percent of the 5.6 million individuals impacted by the crisis. The ASNP 2 will extend the support to 30,000 COVID-affected households beyond the emergency phase.

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10   Schnitzer, 2018.
11   Public expenditure review (PER) of the social protection sector (2020)

3.2. Household coping strategy

To cope with shocks, the most commonly used strategy for Nigerien household is to rely on friends and family, sale of livestock, and savings, a sign that coverage formal society nets programs are limited in Niger (Box 3). Chapter 2 shows that 95 percent of Nigerien households own some type of livestock, yet on average, less than 20 percent of the total stock of animals were sold in the market to generate income in the last 12 months. This reflects the fact that Nigerien keep livestock as one of the risk-coping strategies and saving mechanisms. The pattern is consistent with the literature on livestock assets in SSA countries (see Pica Ciamarra et al, 2011, Maziku et al. 2017, and Jha 2019).

The strategy of using savings is significantly underused in Niger compared with other Sahel Countries. In Niger, less than 30 percent of the population rely on savings to recover from shocks compared to over 40 percent in Burkina-Faso, Mali, and Chad. As mentioned in chapter 1, households' capacity to save has also declined over time.

To get through difficult times, rural households sell livestock. 22 percent of rural households and 4 percent of urban households stated that they sold their livestock to mitigate the shock. 7 percent of the rural households reported they ever reduced consumption in order to manage a certain risk (Figure 64). No significant difference is observed for the use of other strategies.

Figure 62. Most households rely on support from family and friends, sale of livestock, and savings to manage risks.
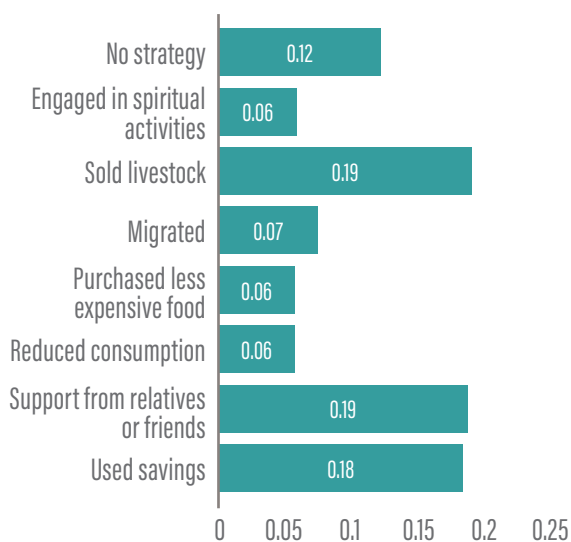
Figure 63. Savings is underused in Niger compared to other Sahelian countries.
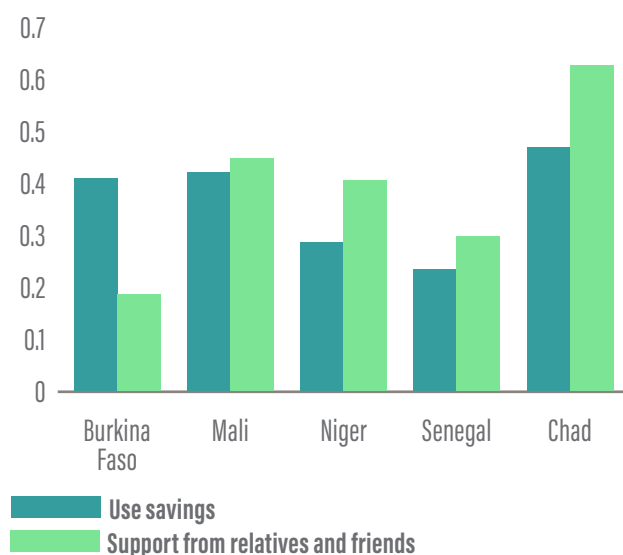
Source: World Bank staff calculation based on EHCVM 2018/19.

Figure 64. Rural households sell livestock
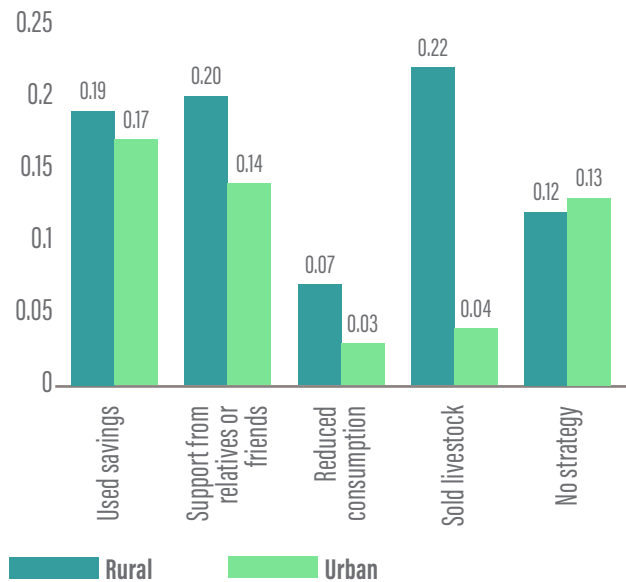
Figure 65. Poor are more likely to get support from family or friends

Source: World Bank staff calculation based on EHCVM 2018/19.
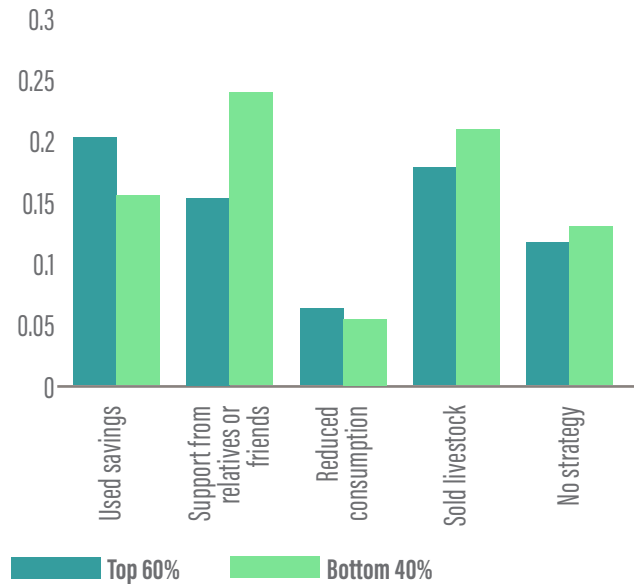
Coping strategies vary across different categories of shocks. To study the households coping behavior by each type of shock, the 22 shocks discussed in the previous section can be grouped into 7 categories.[12] Figure 66 presents the most frequently used coping strategies by type of shock. When coping with employment shocks, natural hazards, health, household issues, and price shocks, using saving is the most frequently adopted strategy by households. With the surge of conflict shocks,

however, 17.4 percent of households didn't take any actions, higher than the other shock categories. In Diffa, the most often used strategy is no strategy at all. Support from government and engage in spiritual activity are also used frequently. In Maradi, the newly emerging conflict zone, the majority of households don't have means to mitigate risk. Households in Tillaberi have to reply on government support most of the times.

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12   **Household issues:** divorce/separation, suspension of regular transfers from other households. **Prices**: decline of farm products prices, high prices of agricultural inputs, high prices of food products. **Natural hazards**: drought, flood, crop disease, animal disease, locust attacks or other crop pests, landslide. **Employment**: Significant loss of household's non-farm income, bankruptcy of household non-farm enterprise, significant loss of wage income, loss of wage employment. **Health**: illness/accident of family member, death of family member. **Crime and safety**: theft of money/assets/crops/livestock, farmer/Livestock farmer conflict, armed Conflict/Violence/Insecurity. **Other**: other shocks not classified above.

Figure 66. Coping strategies vary by shock categories
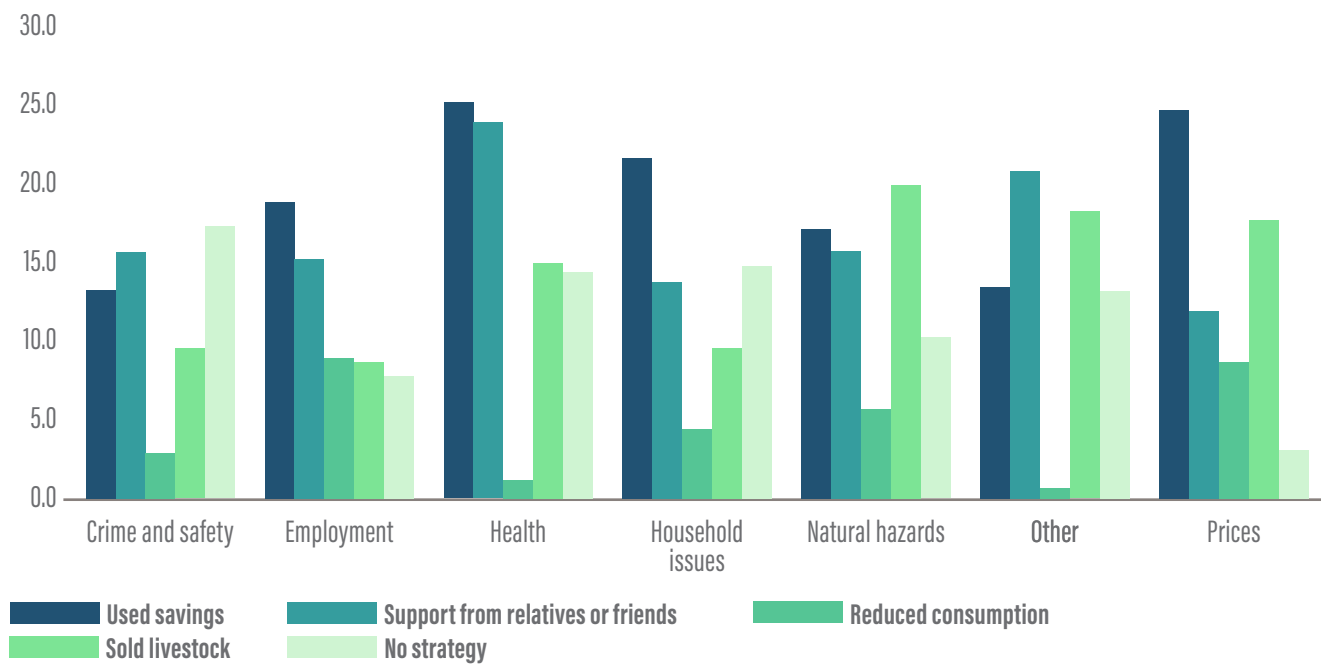
Source: World Bank staff calculation using EHCVM 2018/19

3.3. Effects of shocks on welfare

In this section, we use multivariate regressions to explore the correlation between different types of shocks and welfare. Households' idiosyncratic health shock is defined as having a death of a household member in the past 3 years. This information is self-reported from EHCVM 2018/19. Drought is calculated from CHIRPS data, which provides a measure of monthly rainfall for each 5.7 by 5.7 km pixel in the country. Households affected by drought are defined as those living in areas with precipitation levels below one standard deviation from its 10-year monthly average for at least one month in the planting season. Two other definitions of drought – severe drought identified as two consecutive months below their respective 10-year average rainfall during the planting season, and self-reported drought shock from EHCVM 2018/19 – were used as a sensitivity test. Conflict shock is measured as the logged number of fatalities within 25 km radius of households. Data on conflicts and fatalities come from the Armed Conflict Location & Event Data Project (ACLED). For robust test, we apply different radius, 15 km and 20 km, as well as self-reported conflict experienced by households from EHCVM 2018/19. Our regressions control for a rich set of household characteristics (e.g. household size, female-headed household, household age, household head education level, and the number of people in different age groups), household access to infrastructure (water, electricity, improved sanitation), households' productive assets (land size, livestock, agricultural input), and regional fixed effect. Annex 4 provides more technical details.

Our multivariate regressions suggest that conflicts are negatively correlated to household food consumption in rural areas. Experiencing any conflict in the past three years is associated with a decline of 17 percent in rural areas. The significant impact in rural areas is consistent with Ibáñez, A. M., & Vélez, C. E. (2008). They study the impact of conflict on welfare in Columbia and find that the welfare losses caused by displacement are 37% of the net present value of rural lifetime aggregate consumption.

Droughts show a negative and significant correlation with consumption of affected households in both rural and urban areas. Households experiencing drought in urban areas have seen their consumption declined by as much as 25 percent, and their food consumption reduced by 22 percent. Meanwhile, drought-affected households in rural areas have their consumption 9 percent lower than unaffected households. According to Gerber (2017), the impacts and costs of droughts can be extensive in urban areas. In addition to specific industries (e.g. food and beverage), this also puts the service sector (e.g. tourism) at risk and could spark social tensions. The urban costs of droughts will continue to grow in the future due to climate change and expanding urbanization, and are magnified by relatively higher levels of returns from urban compared with agricultural water use.

However, health shocks is adversely associated with household consumption in urban areas only. Urban households who experienced the death of a household member have food consumption 13 percent lower than other urban households. Our findings is consistent with the literature where health shocks are often found to be negatively correlated with welfare. Wagstaff (2007) suggests that urban households were more vulnerable in terms of reduced earned income; while Atake (2018) finds that the poorest households, such as those in Sub-Saharan French-Speaking Africa countries (SSAF) may be the most vulnerable to health shocks.

Figure 67. Conflicts and droughts are significantly associated with lower household consumption

		value
Conflict	Urban	0.0253
	Rural	-0.0555
Drought	Urban	-0.25***
	Rural	-0.09***
Death hh	Urban	-0.079
	Rural	0.0128

-0.3 -0.25 -0.2 -0.15 -0.1 -0.05 0 0.05
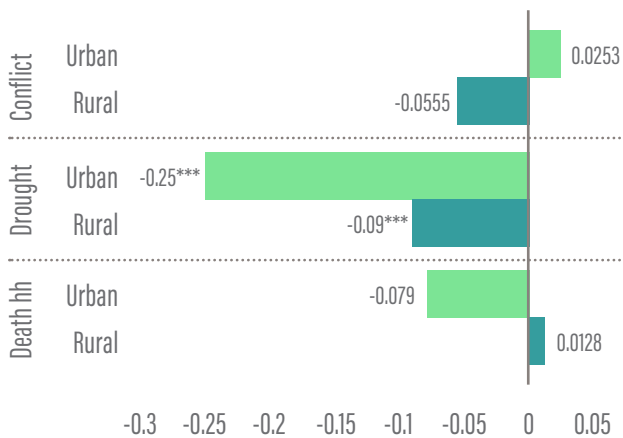
Figure 68. The magnitude of correlation between shock and food consumption is even larger.

		value
Conflict	Urban	0.0398
	Rural	-0.166**
Drought	Urban	-0.217**
	Rural	-0.0961***
Death hh	Urban	-0.125*
	Rural	0.0297

-0.25 -0.2 -0.15 -0.1 -0.05 0 0.05 0.1
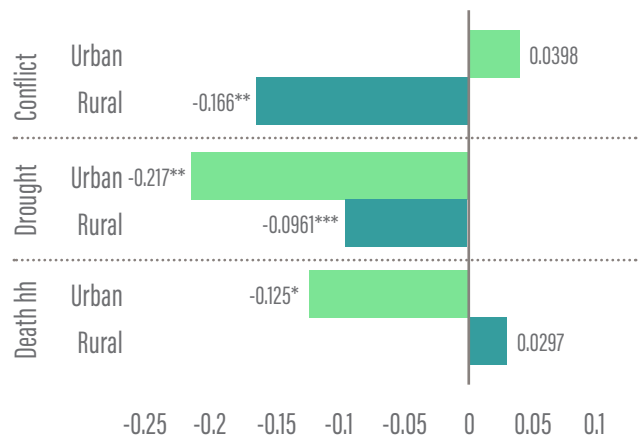
Source: World Bank staff calculation based on EHCVM 2018/19

Box 4 : Evidence on the impact of safety nets

Several evaluations have been conducted on the impact of safety net in Niger. Below the main lessons learned.

Cash transfer programs targeting poor households can mitigate the adverse effects of climate shocks and fostered resilience by facilitating savings and economic diversification. The impact evaluation[13] carried out in six communes in the regions of Dosso and Maradi during the first phase of the cash transfers (2013-15) showed that cash transfers improved household welfare and food security. Importantly, cash transfers helped households to mitigate the adverse effects of climatic shocks and protect consumption levels better than the control group. Several mechanisms contributed to enhance resilience among cash transfer beneficiaries. They were more likely to participate in savings groups and save more. They were also engaged in more diversified agricultural and non-agricultural activities, and had higher earnings from these activities during droughts, which suggests income-smoothing. Savings and diversification of income-generating activities reduced the need for adverse coping mechanisms. On the other hand, the evaluation found limited impact on asset accumulation, with few differences in household durables and livestock.

The combination of cash transfers with human capital accompanying measures provided added value in terms of improving practices aimed at promoting human development. The impact evaluation[14] showed a positive impact on women's knowledge and practices related to children's health, nutrition, and development. Women were the cash transfer recipients and the main beneficiaries of the accompanying measures. Placing women at the centre of the safety net implementation increased their visibility and productive inclusion, hence strengthening their empowerment. Despite their positive impact, accompanying measures did not significantly improve children's physical growth or cognitive development. Evaluation results suggest that this type of impact may require longer term interventions and that training, even when combined with cash transfers, may not be enough. Improvements in relevant services are necessary to give beneficiaries the necessary support for healthy child development.

Productive inclusion measures integrated into the safety net system yielded cost-effective results and produced considerable impact on households' income, food security, resilience and well-being compared to cash-only. The impact evaluation[15] showed that productive inclusion measures helped to boost investments and diversify off-farm income-generating activities, which led to strong increases in revenues and profits. It also showed higher levels of total consumption and food security among beneficiaries, who also experienced improved mental health and a greater sense of worth. The program created a safe space and fostered group dynamics and peer learning. Beneficiaries experienced stronger social and financial support, higher trust, and greater capacity for collective action. Women reported greater aspiration and decision-making power over their own resources. The program improved gender attitudes and perceptions of women engaging in economic activities.

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13   Premand P., Stoeffler Q. (2020) Do Cash Transfers Foster Resilience? Evidence from Rural Niger

14   Premand P., Barry O. (2020). Behavioral Change Promotion, Cash Transfers and Early Childhood Development Experimental Evidence from a Government Program in a Low-Income Setting

15   Briefing paper: "Productive inclusion measures in the Sahel. An integrated approach to promote the economic activities of poor and vulnerable households".

3.4. Conclusion

The most important shocks Nigerien households face are natural hazards, health related shocks, high food prices, and insecurity. This chapter uses descriptive statistics and econometric techniques to provide an assessment of the extent to which various shocks affects households in Niger. Poor rainfall has huge consequences on poverty, especially, given that in Niger, most poor rely on rainfed substance agriculture for livelihood. Similarly, recrudescence of conflicts in recent years have contributed to difficulties for households to conduct normal economic activities, resulting in lower income. This chapters provide strong evidence that drought and conflicts result in lower household consumption.

In a context were formal social assistance program are very limited, households' resorts to sub-optimal coping mechanisms which in turn can have long lasting effects, including on early childhood development. When a shock occurred, most households cope by using their savings, by asking support from friends of family, by reducing their food consumption, by selling livestock, or by doing nothing at all. All these coping mechanisms are sub-optimal and could potentially have long term negative impact on the households. In the case of a reduction of food consumption for example, it has been demonstrated in the literature that a reduction of food consumption will increase the level of food insecurity which in turn could affect early childhood development.

Going forward, the country should establish a nationwide well-targeted and adaptative social protection system in order to efficiently reduce the negative impact of shocks on households. Evidence from the literature suggest the successful impact of such approach (Box 4). More recently, Thomas Bossuroy & Patrick Premand (2020) shows that safety nets programs can be enhanced to further boost economic inclusion and resilience, and that productive inclusion programs integrated to safety nets have great potential to protect and promote livelihoods.

4 HUMAN CAPITAL

This chapter presents an updated description of human capital - education, health, and food security - in Niger. Building on the recently available survey, a mixed of descriptive and econometric analysis is used to provide an overview of the human capital landscape in Niger.

4.1. Achievements in human capital index

The Human Capital Index (HCI), first introduced by the World Bank in 2018, is an aggregate measure of key components of human capital in a country. It is defined as the expected future productivity, relative to the current health and education outcomes. Constructed around three components, namely survival, education and health, the index applies five key measures that global research has linked to productivity: Child Survival, School Enrollment, Quality of Learning, Healthy Growth and Adult Survival. The indicators applied to measure performance under these components include: mortality rate of children under 5 years of age, the number of years of school attendance by age 18, harmonized test scores, number of children age 15 who survive until age 60, and the rate of stunting for children under 5 years of age. The index calculates a single value between 0 and 1, based on how much each indicator contributes to the productivity of an adult (World Bank, 2018).

Table 11. Human Capital Index and its components across benchmark countries

Indicator	Burkina Faso	Chad	Mali	Niger	Sub-Saharan Africa	Low Income
HCI Component 1: Survival						
Probability of Survival to Age 5	0.924	0.881	0.902	0.916	0.934	0.928
HCI Component 2: School						
Expected Years of School	7.0	5.3	5.2	5.5	8.3	7.6
Harmonized Test Scores	404	333	307	305	374	356
HCI Component 3: Health						
Survival Rate from Age 15 to 60	0.761	0.646	0.750	0.767	0.735	0.747
Fraction of Children Under 5 Not Stunted	0.751	0.602	0.731	0.515	0.688	0.654
Human Capital Index (HCI) 2020	**0.38**	**0.30**	**0.32**	**0.32**	**0.40**	**0.37**

Source: World Bank (2020)
Note: Scores from international tests are converted into harmonized learning outcomes, with values ranging from approximately 300 to 600 across countries (World Bank 2020).

In 2020, Niger was ranked 155th out of 157 countries in the global ranking of the HCI.[16] The HCI for Niger estimated at 0.32, indicates that a typical child born today can expect to attain only 32% of their productive potential as an adult (World Bank, 2020a).   When compared to neighboring countries in the Sahel, Niger performs equally poorly (Table 11). In the region, Niger and Mali tied at a close range with a HCI averaging 0.32 greater than the HCI for Chad (0.30), but much lower than that of and Burkina Faso (0.38). Across these four benchmark countries, Niger ranks lowest in three indicators: Harmonized Test Scores, Survival Rate from Age 15 to 60, and Fraction of Children Under 5 Not Stunted.

Between 2018 and 2020, Niger experienced a decline in HCI, a clear move in the wrong direction. Due to limited data availability, it is not possible to have a longer trend of the HCI in Niger. Estimations from the World Bank suggest that human capital index of the country shifted downward from 0.318 in 2018 to 0.316 in 2020 (Table 12). This reduction was experienced by both boys and girls. The poor performance was mainly driven by a deterioration of the nutrition status of children.

The spatial distribution of the HCI shows important region disparities, with two regions who are leading (Niamey and Agadez) and the rest remaining behind. Niamey, the region that includes the capital city of the country, has the highest HCI estimated at 0.49 (Figure 69). Agadez then follows with an HCI of 0.39. The remaining regions are all have an HCI with values ranging between 0.29 and 0.32. Consequently, improvement of the country's performance will require closing the spatial gaps.

In Niger, poverty is associated with low human capital. As illustrated under Figure 69, there is a clear and strong correlation between poverty and human capital index. This is not surprising, as the HCI summarize the key endowments that an individual will bring to the labor market. A high HCI reflect better endowment, and more chance to access quality jobs and to be more productive.

Table 12. Human Capital Index (HCI) and its components for the year 2018 and the year 2020

	Male		Female		Male+Female	
Indicator	2018	2020	2018	2020	2018	2020
HCI Component 1: Survival						
Probability of Survival to Age 5	0.910	0.913	0.917	0.920	0.913	0.916
HCI Component 2: School						
Expected Years of School	5.962	5.936	5.059	5.045	5.518	5.498
Harmonized Test Scores	307.091	307.091	302.089	302.089	304.922	304.922
HCI Component 3: Health						
Survival Rate from Age 15 to 60	0.745	0.752	0.773	0.781	0.759	0.767
Fraction of Children Under 5 Not Stunted	0.572	0.497	0.602	0.532	0.587	0.515
Human Capital Index (HCI) 2020	**0.320**	**0.318**	**0.315**	**0.313**	**0.318**	**0.316**
Uncertainty Interval	[0.30,0.34]	[0.29,0.34]	[0.29,0.33]	[0.29,0.33]	[0.30,0.34]	[0.29,0.33]

Note: HCI 2018 back-calculated - Estimate
Source: World Bank (2020)
Note: Scores from international tests are converted into harmonized learning outcomes, with values ranging from approximately 300 to 600 across countries (World Bank 2020).

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16   The Central African Republic ranked last with a HCI of 0.29.

Figure 69. Human capital and poverty

Human capital across region

Human capital and poverty

$y = 1256.4x^2 - 1193x + 289.6$
$R^2 = 0.938$
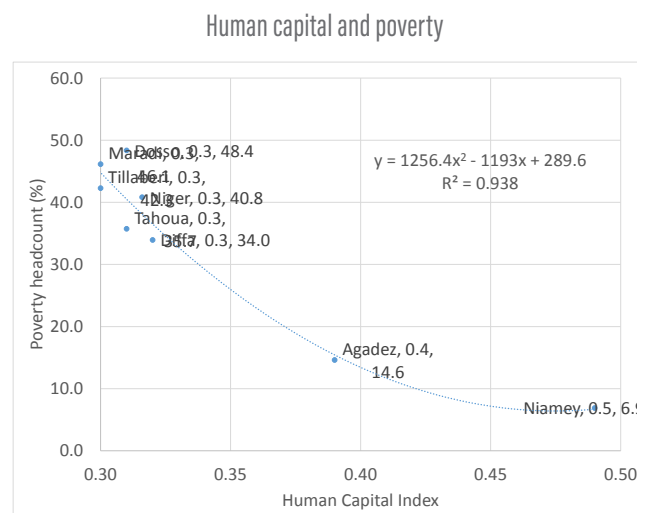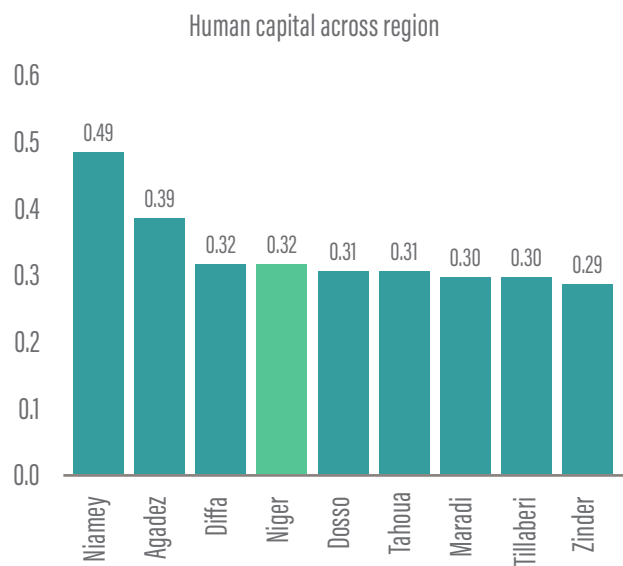
Source: World Bank staff calculation based on EHCVM 2018/19.

4.2. Education

Despite progress in recent years, Niger continues to experience both low schooling rate and high gender disparities in primary and secondary education. Table 13 highlights the high dropout rate with 45% of students enrolled in primary school not continuing with enrollment at the secondary school level. The same picture is observed across the four neighboring countries with less than a third of the students attending secondary school as compared to over half of the students attending primary school. Niger ranks second lowest on net enrollment rate for secondary school and percentage of secondary and primary school students who are female. Beyond enrollment rates, Niger also faces a challenge of poor access to quality education with the lowest performance on the harmonized test score (Table 11).

Compared to its regional peers, investment in education remains low. Niger has the second lowest expenditure on education as a percentage of GDP (3.5%) when compared to neighboring countries (Table 13) and the lowest share of government expenditure on education (13.2%). The low government expenditures have a consequence on the ability of the state to provide quality education. The limited resources are not enough to cover the cost related to human resources, physical infrastructures, learning materials, scholarship, etc. Yet all these are critical factors that affect satisfactory academic achievement level.

Table 13. Education investments and outcomes across benchmark countries

	Government expenditure on education as % of GDP	Expenditure on education as % of government expenditure	Net enrollment rate, primary (%)	Net enrollment rate, secondary (%)	% of primary students who are female	% of primary students who are female
Burkina Faso	6.4	21.4	76.4	29.1	48.8	48.4
Chad	2.5	16.4	73.2	18.9	43.4	31.3
Mali	3.8	16.5	61.3	29.4	46.4	44.1
Niger	3.5	13.2	65.1	20.1	45.6	41.9

Source: UNESCO Institute for Statistics (2020)
Notes: These numbers refer to the year 2017 except for enrollment numbers in Chad, which are from 2016.

The probability of being enrolled in a school is higher for boys compared to girls with a bigger gap at the tertiary related age group. The highest enrollment rates is recorded among the 7-12 age group at 54% while the lowest were for 3-6 age group indicating that early childhood education trails behind for both girls and boys (Figure 70). Among the 13-15 age group, 57% of boys were enrolled in school compared to 51% of girls resulting in a gap in enrollment of 6 percentage points. The gap between boys and girls' enrollment is much higher for the age group 18-14 years old, 9 percentage points. In general, enrollment rates decline once students turned 19 years old possibly due to girls getting married and boys starting to shoulder the responsibilities of bread winner within the household. However, girls seems to be dropping out much faster.

Figure 70. School enrollment rates by gender and age group
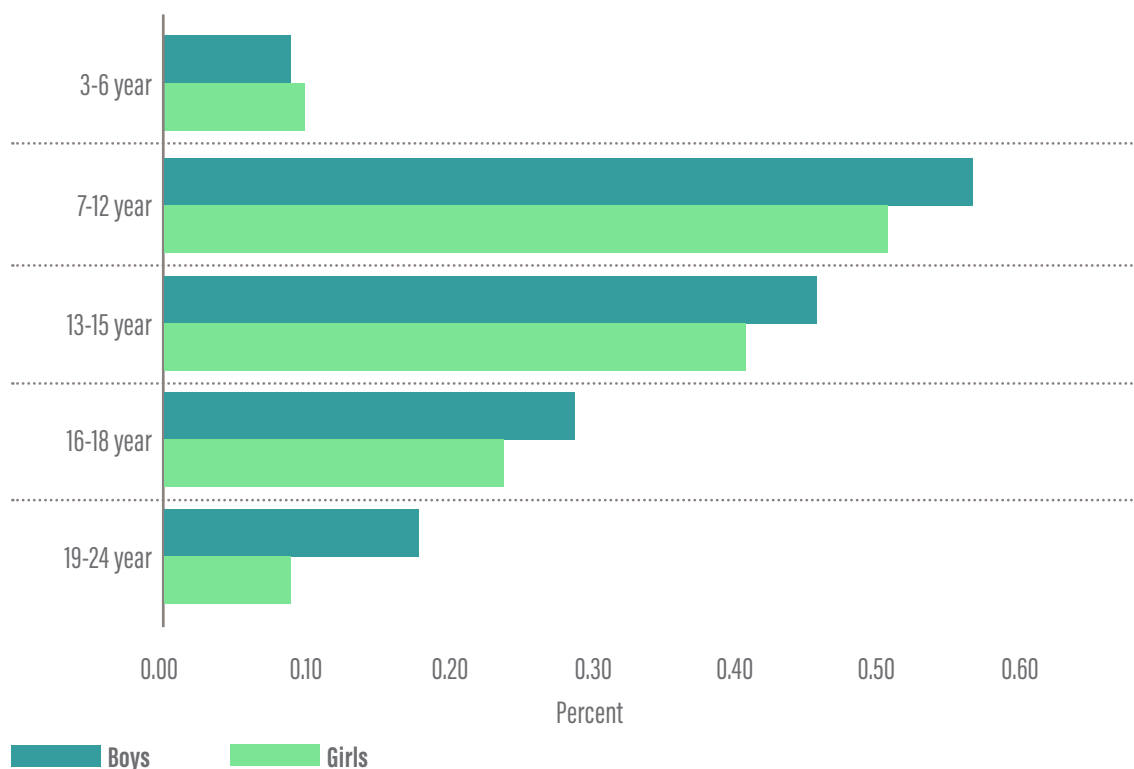
Source: World Bank staff calculation using data from EHCVM 2018/19

Households in the highest wealth quintiles are more likely to send their children to school but early childhood education enrollments are low across all the wealth quintiles. School enrollment rates are the highest among the 7-15 age group and they are more likely to be from wealthier households (Figure 71). In fact, enrollment rates for ages 7-12 are the highest among households in the highest wealth quintile at 74% in contrast to an enrollment rate of 40% and 46% for the lowest and second lowest

wealth quintile, respectively. Early childhood education is low across all wealth quintiles with the rates hovering around 6%-19%. The gap in enrollment rates across wealth quintiles is the lowest for ages 3-6 indicating that challenges in accessing Early Childhood Education Center is more evenly distributed. However, enrollment rates drop significantly for the tertiary level age group (19-24 age group) and with the highest wealth quintile exhibiting the highest rate of 22%.

Figure 71. School enrollment rates by age group and wealth quintile
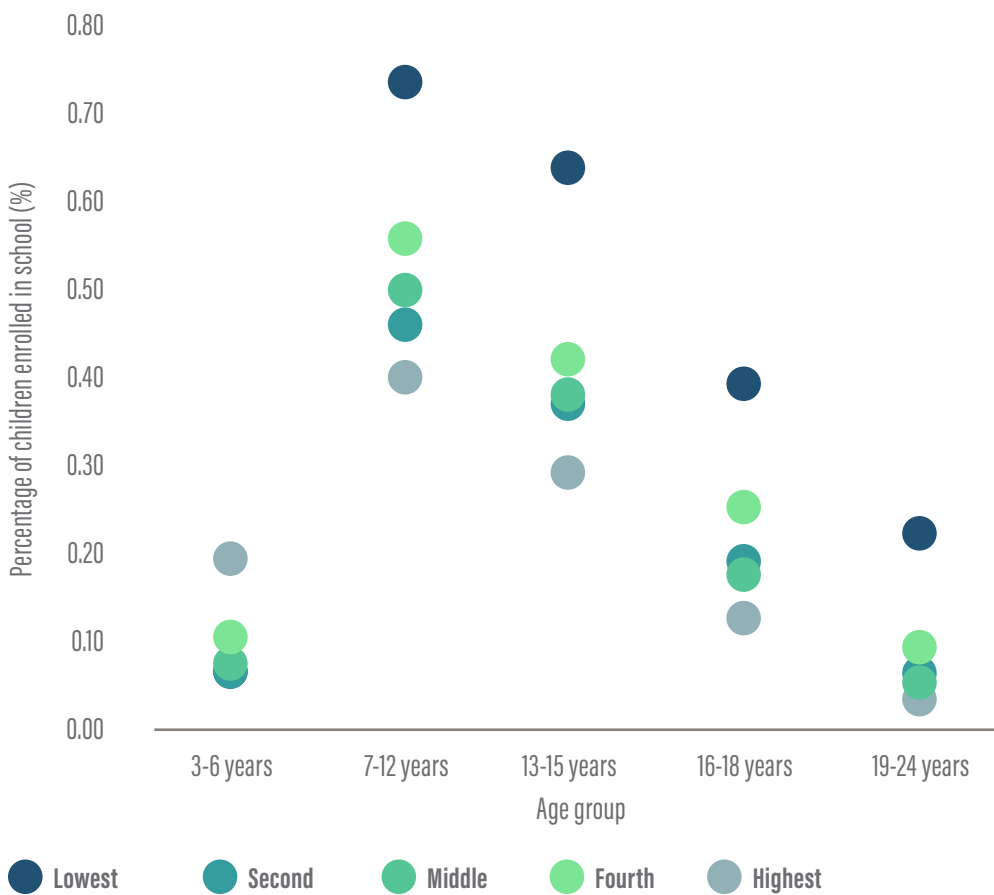
There are important spatial differences in primary school enrollment (children aged 7-12). Primary school enrollment rates for urban children are much higher than among rural students with a difference of approximately 41 percentage point between urban and rural areas. There are also important differences across regions (Figure 72). The region containing the capital city of Niamey stands out, with 92 percent of children aged 7 to 12 who are attending school. The region of Agadez and Dosso also performed well, with an enrollment rate of 64 percent each. On the other extreme, enrollment is much lower for Zinder and Diffa, 44 and 39 percent respectively. This suggests that there is need for policies to equalize access to primary school education at the country level.

Figure 72. Primary school-age (7-12 years) enrollment rate by region
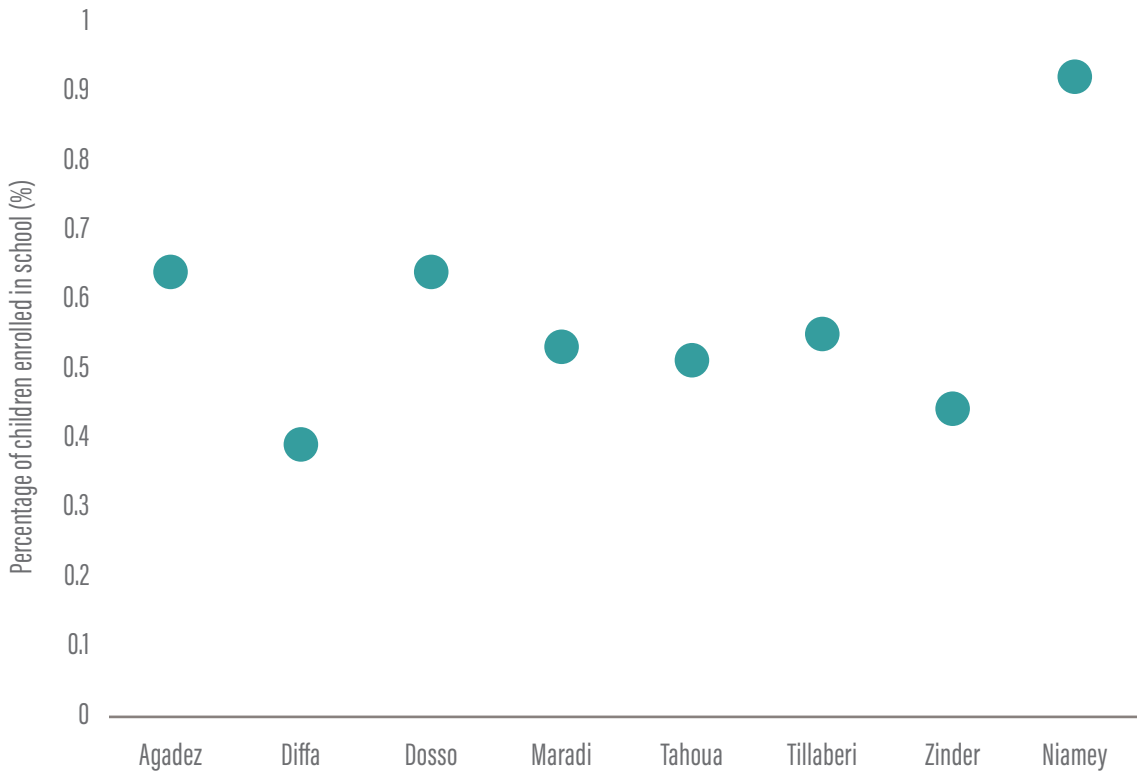
Source: World Bank staff calculation using data from EHCVM 2018/19

For both girls and boys, family disavowal is by far the main reasons for never attending a formal school. Among boys aged 7 to 24 years old, 42% never attended school because there their family didn't want (Figure 73). The corresponding number for girls is slightly higher (42%). Families appear to refuse to send girls to school at a slightly greater rate compared to boys. This is in addition to girls reporting not being sent to school because of their gender (7%). Issues related to unavailability of school facility, and tradeoff between school and work are also important constraints to schooling. The tradeoff between schooling and work, and issues related to the perceived importance of school are more pronounced for boys. The fact that parents are refusing to send their children to school is likely due to a clear tradeoff between expected return to school (child probability to graduate and to find a good job), and immediate benefit via child labor or early marriage. To affect parents' decision in a positive manner, several factors must be aligned, including improved supply of quality education, job creation to ensure better transition from school to quality jobs.

School enrollment is generally associated with a lower participation in paid and unpaid work but there are gendered differences. As they grow older, girls are more likely to spend more time more time on domestic work compared to boys (Figure 74). This pattern is more pronounced for girls between the ages of 16 and 24 and not enrolled in school. On average, a girl between 19-24 and out of school spent 34 hours a week taking care of a child, collecting wood and water compared to 8 hours for a boy in the same category. The analysis also suggests that there is a tradeoff, and that going to school slightly reduces the number of hours girls spent on domestic chores. However, their level of involvement in domestic activities remained far greater than that of their male peers in school and not in school.

Figure 73. Distribution of reasons for having never attended a formal school (ages 7–24)

Girls: Being a girl 7% | No school/too far away 16% | Family refuse 46% | Paid/Unpaid work 14% | Too expensive/not enough money 1% | School not suitable/useful 10% | Others 7%

Boys: No school/too far away 15% | Family refuse 42% | Paid/Unpaid work 14% | Too expensive/not enough money 1% | School not suitable/useful 15% | Others 11%

Legend:
- Being a girl
- No school/too far away
- Family refuse
- Paid/Unpaid work
- Too expensive/not enough money
- School not suitable/useful
- Others

Source: World Bank staff calculation using data from EHCVM 2018/19

Figure 74. Hours of domestic work and work outside home in the past week, disaggregated by gender, age group, and school enrollment (mean values)

Source: World Bank staff calculation using data from EHCVM 2018/19

As they transition into adulthood, both boys and girls incur greater responsibilities that translate into increased participation in work outside of the home. Indeed, girls 19-24 who were not enrolled in school spent the most time on domestic work (38 hours) and boys of the same age group and not in school (58%) were the most likely to report participating in income generating activities including farm work, self-employment, and wage work (Figure 74). Across all the age groups, enrollment in school was associated with a lower involvement in work outside of the home. This potentially indicate that the decision to keep children in school has significant financial implications, especially for families in need of both the income and extra labor provided by their school aged children.

Deterioration of classrooms, and frequency of tuition fees are by far the most important problems raised by parents. In fact, 38% of public-school parents reported that their schools faced issues of deterioration of the classrooms (Figure 75). This problem is also important for community schools. The frequency of tuition fees is the second most important issue raised by parents, especially for public and community schools. Absenteeism of teacher is an important problem for community school, and to some extent, public schools as well. Other issues are equally important for public and community schools: lack of teachers, overcrowding, lack of supply. A couple of other issues are predominantly mentioned for public schools only: poor education, lack of bathrooms, and lack of equipments. It is important to note that compared to public and community schools, private schools have less problems, and parents tend to be more satisfied by the services provided in these private schools.

Figure 75. Problems reported at schools, disaggregated by school type (%)
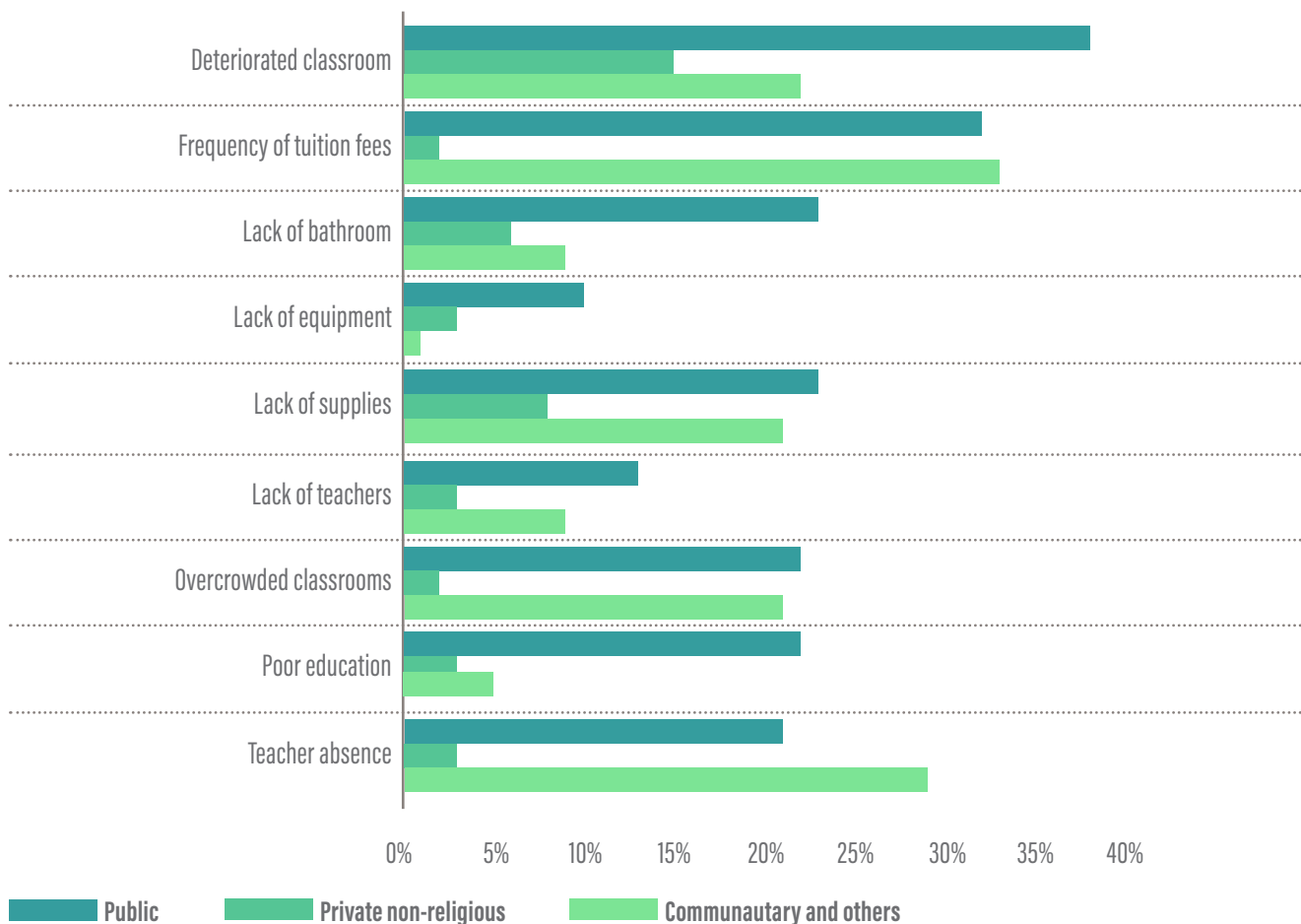
Source: World Bank staff calculation using data from EHCVM 2018/19

Being a girl and residing in a rural area significantly reduced the likelihood of school enrollment while being of primary school age improves the probability of being in school. To estimate the correlates of school enrollment we use a multivariate analysis (logistic model) presented in Figure 76. The results indicate that girls and rural children are the least likely to be enrolled in school. In contrast, primary school age children (ages 7-12) have a higher likelihood of being in school compared to any other age group. Having siblings in school, or one of the parents with at least a primary school education are also correlated with a higher likelihood of being enrolled in

school. Additionally, the wealth level of families is a key determinant of the school enrollment as households in the higher wealth quintiles are significantly more likely to send their children to school. As one would expect, the proximity of a school either in the village or neighborhood increases the likelihood of enrollment. Surprisingly, even when parents report many problems at schools it does not negatively affect enrollment rates. This could be due to the fact that families often don't have many options for where to send their children for school.

Figure 76. Correlates of the likelihood of being enrolled in school (logit marginal effects with 95% confidence intervals)

Average Marginal Effects with 95% CIs
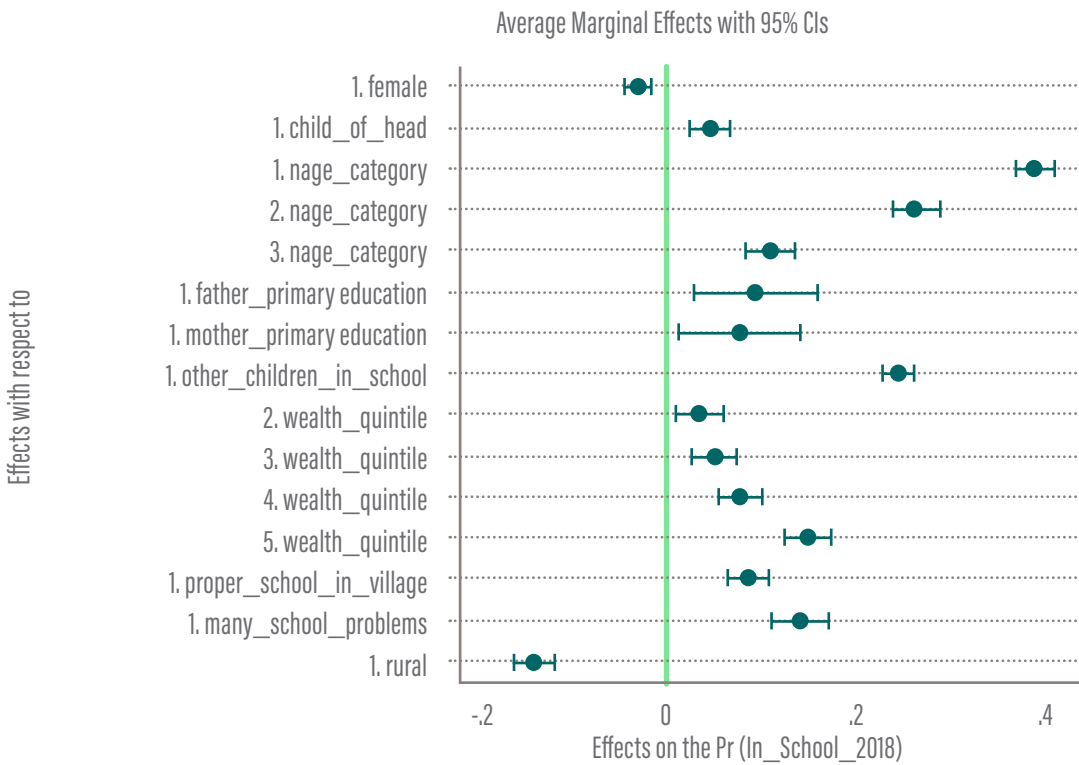
Source: World Bank staff calculation using data from EHCVM 2018/19

Notes: Base group for age is 3–6 years old; 'Father – primary school' is an indicator for the individual's father having attended at least some primary school; 'Other children in school' is an indicator for there being other household members enrolled in school; 'School in village/neighborhood' is an indicator for whether there is a school in the village that is appropriate for this individual, given their school attainment or age; 'Many school problems' is an indicator for whether local households report an above-median number of problems associated with the schools. This regression is limited to ages 3-18 because the survey captured local school presence (an explanatory variable) only up to high school.

Across age groups, men exhibited higher literacy rates compared to women. Consistent with increased enrollment rates in recent years, literacy rate is much higher for the younger cohorts. For instance, the literacy rate among the 15-25 age group is 46.5 percent, compared to only 16.9% for those aged 65 and above (Figure 77). In addition, for all age groups, the literacy for male is much higher for men compared to women. The gap varies between 19 and 29 percentage points. The gap seems to have reduced for the youngest cohorts. However, it remains high, and effort should be made to increase enrollment and survival for women, in order to reduce this gender gap.

Figure 77. Literacy rates by gender and age group
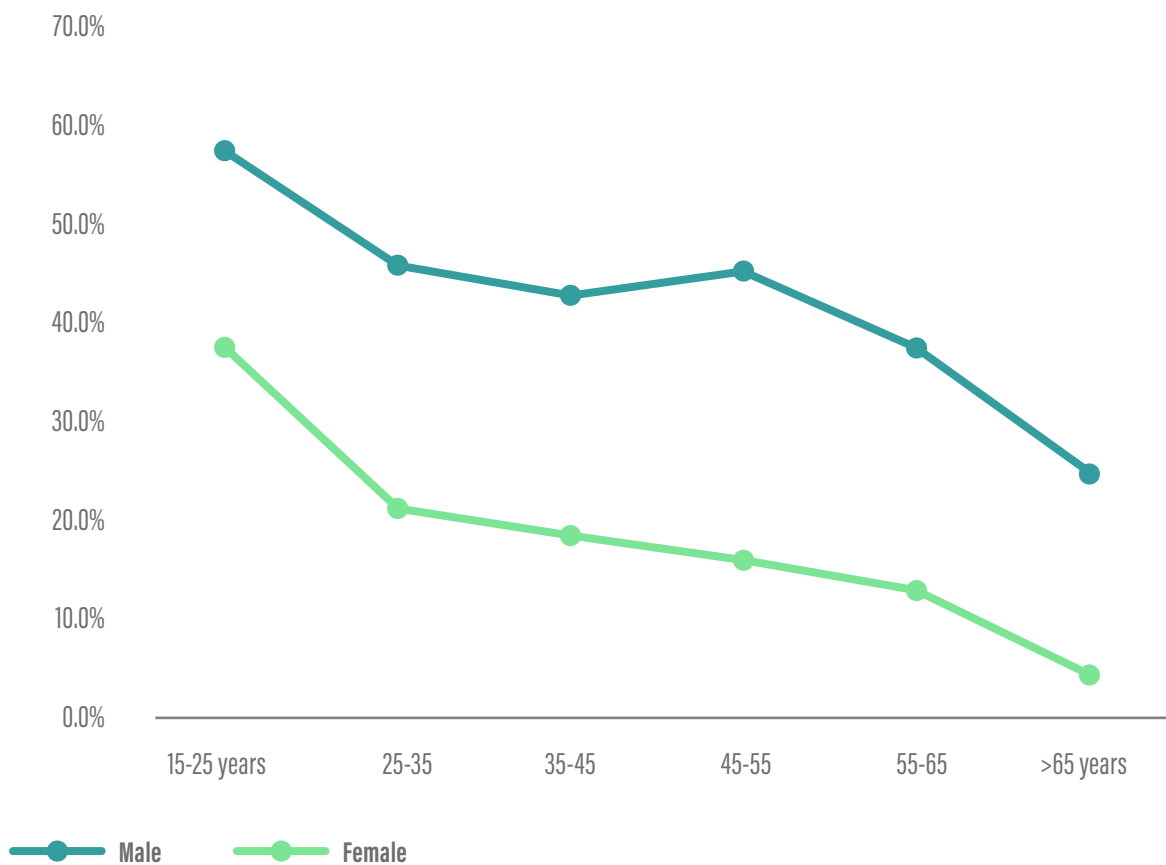
Source: World Bank staff calculation using data from EHCVM 2018/19

4.3. Health

The high rate of early marriage is a potential driver of high rate of maternal mortality. The proportion of deliveries assisted by a skilled birth attendant in Niger was estimated at 32.6% in 2012 (DHS). A catalyst for the high rate of maternal mortality is possibly the high rate of early marriages particularly in rural regions (Figure 78). This is because young adolescents face a higher risk of complications during pregnancy and delivery and therefore high probability of maternal mortality as compared to older women. In Niger, the median age at first marriage for women aged 20 to 49 is estimated at 15.8. Given the low adoption of contraceptive methods, the probability of most young married women to have a baby before they turn 18 years old is very high. The median age at first marriage is much higher for those living in urban areas (18.1) and those in the wealthiest quintile (17.5).

Under five mortality is higher among the poorest and vaccination coverage increases with welfare quintile. As illustrated in figure 79, Under-five mortality is much lower in urban areas (83) compared to rural areas (163). A total of 55 percent of children aged 12 to 23 months are fully vaccinated. There are some disparities across location and welfare. Rural areas have higher rates of children stunted and lower vaccination rates compared urban ones. There is also a clear and strong correlation between welfare quintiles and health outcomes, with children from wealthier households being in a better position.

Figure 78. Maternal health across subpopulations
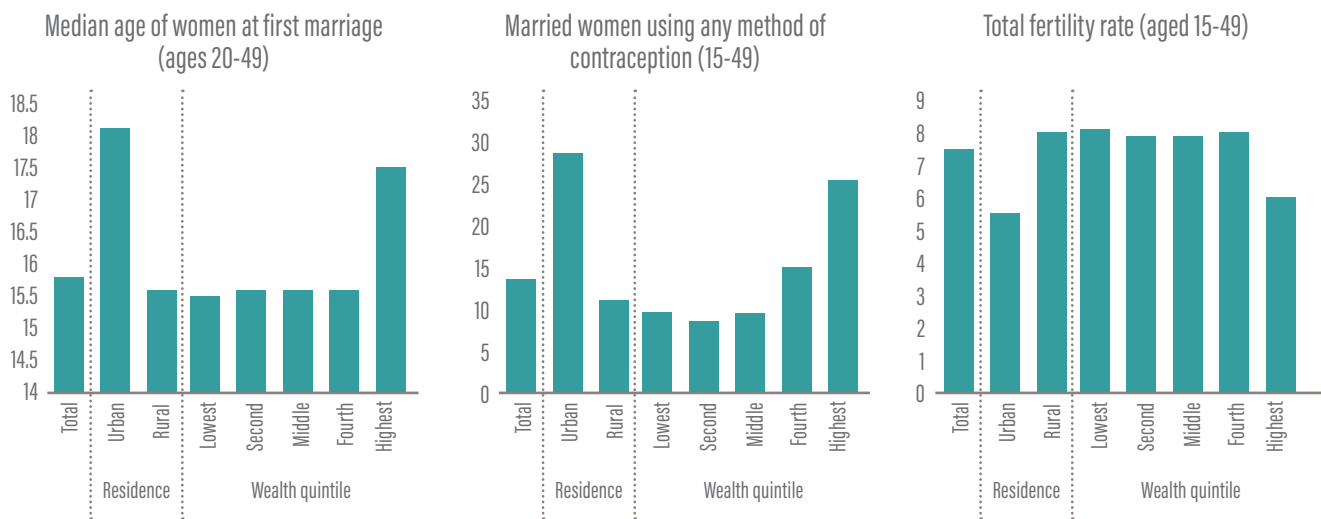
Source: DHS 2012

Figure 79. Child health across subpopulations
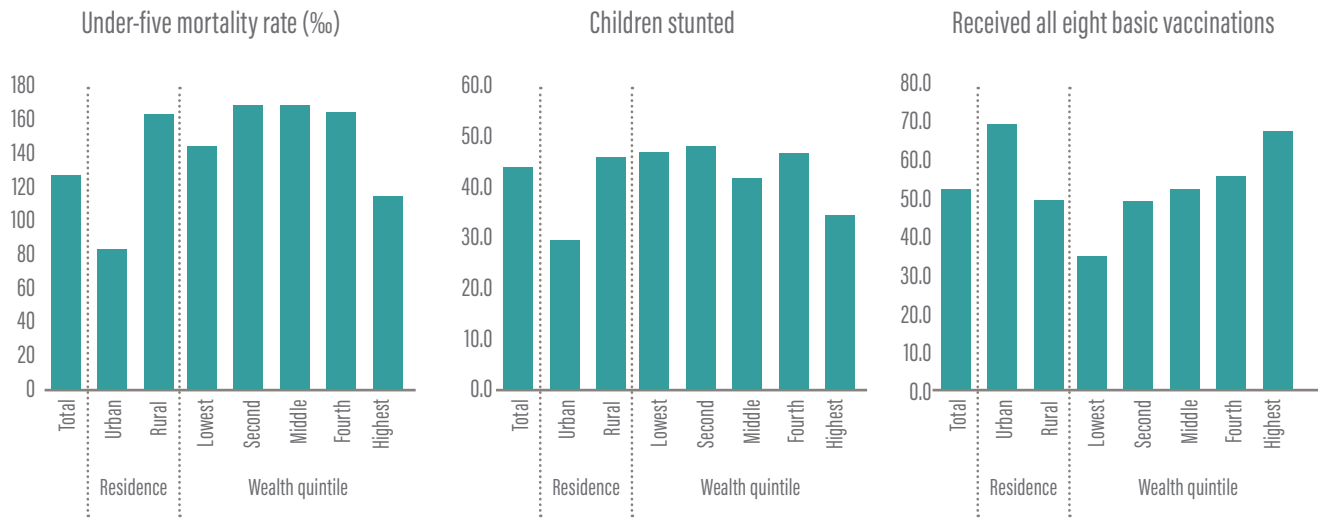
Source: DHS 2012

Morbidity follows life cycle, with children and elderly more likely to fall sick. Clearly, there is a U shape relationship between age and the probability of falling sick (Figure 80). There are no major differences in men and women at both extreme ends of the age distribution, however, for the working age population, women are more likely to fall sick, and to visit health facilities. But overall, babies and children are more likely to seek health care. This is a sign that auto-medication may be at plays when its comes to adults and older people, preferring to visit a health center only when the situation is very serious (Figure 81).

Figure 80. Experiences of illness and rates of visiting a health facility, by gender and age group
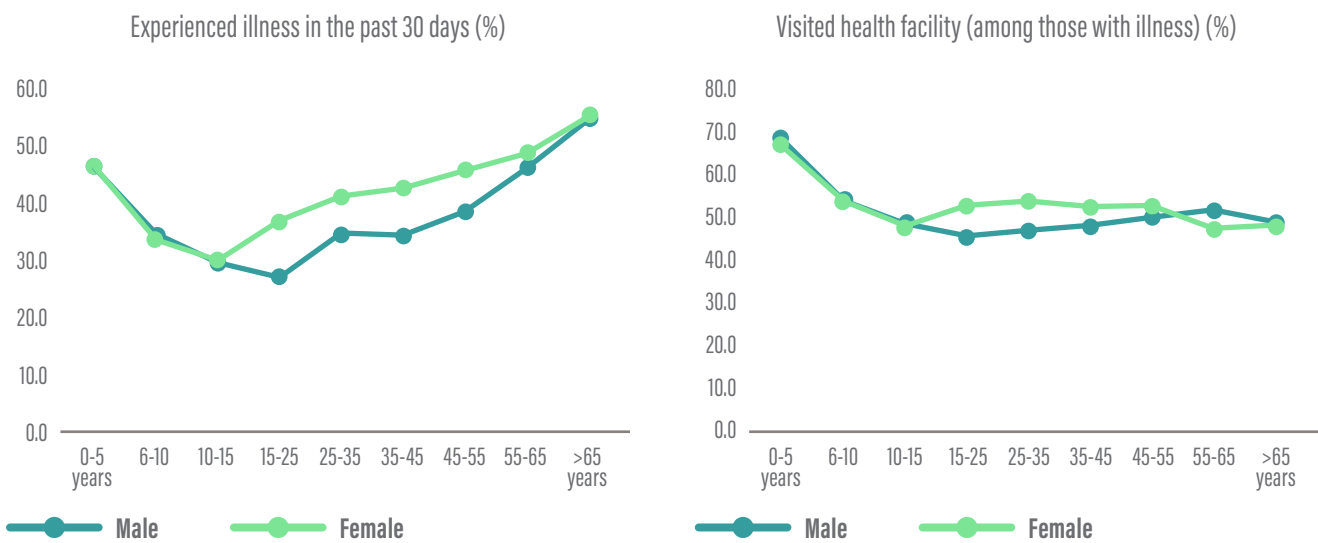
Source: World Bank staff calculation using data from EHCVM 2018/19

Figure 81. Reasons for not visiting a health facility when ill, by wealth quintile
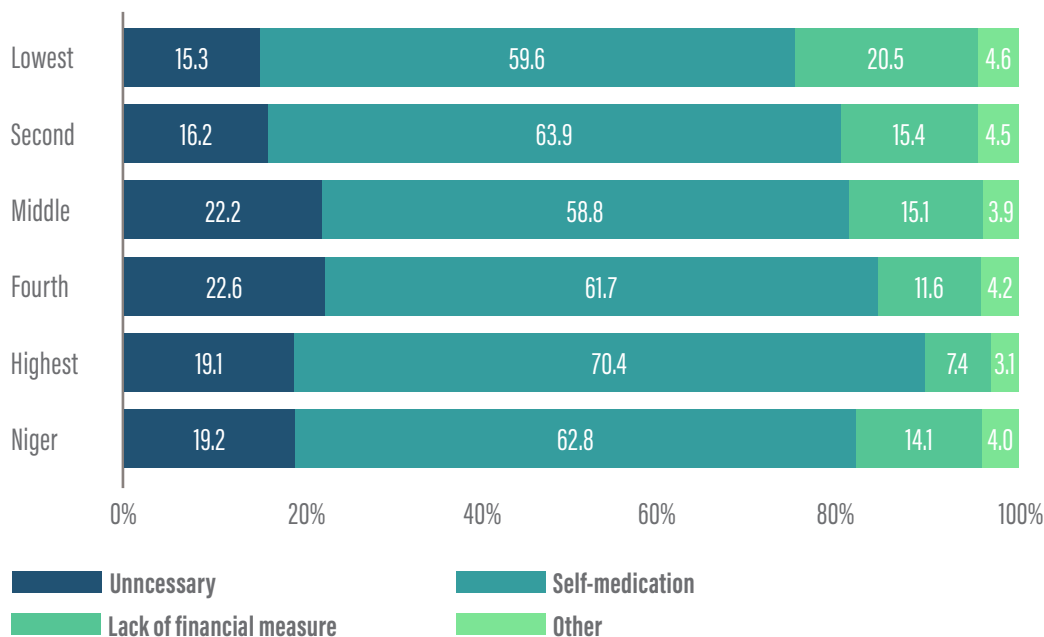
Source: World Bank staff calculation using data from EHCVM 2018/19

While accessing health services, there are several issues that household have to dealt with, the most important one being long waiting time, the lack of medicine, and the high cost. Figure 82 illustrates that public health facilities are perceived overall to have more problems than private ones. The problems patients noted most when visiting both public and private health facility visits were long waiting times, the lack of medicine, and the high cost. The largest disparity in number of complaints between private and public health facilities is for long waiting times and lack of medicine (with a difference of 18 and 17 percentage points respectively). When it comes to cost related issues, the difference between public and private is minor.

Figure 82. Problems reported at public and private health facilities
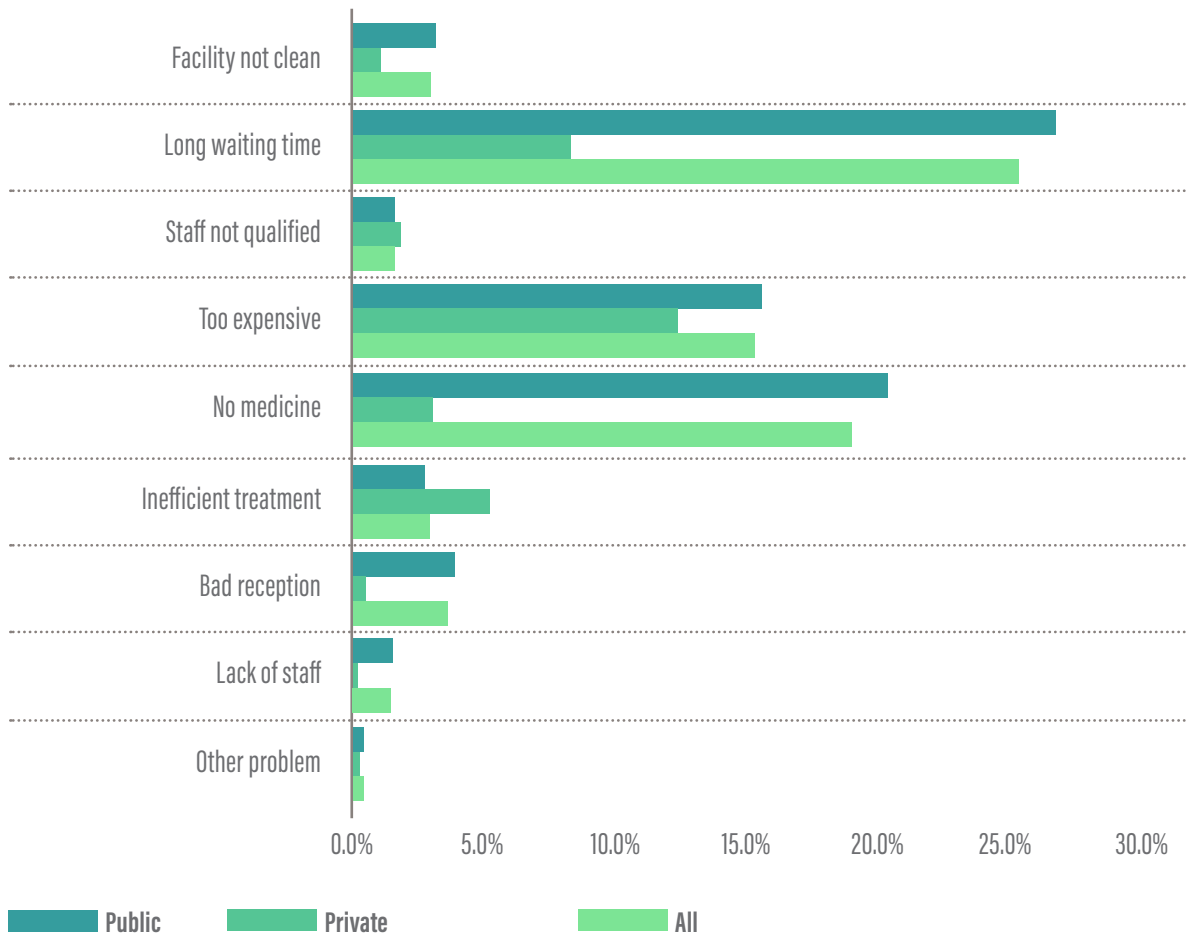
Source: World Bank staff calculation using data from EHCVM 2018/19

4.4. Food security

Chronic food insecurity is prevalent in Niger. Due to data limitations, the country is not ranked in the Global Hunger Index. However, estimations using the 2020 EHCVM suggest that close to two in five households (38.4%) are in a situation of severe food insecurity (Figure 83). An additional one in five households (21.4%) does experience moderate food insecurity. Overall, three in five households is experiencing a form of food insecurity. Food insecurity is more pronounced for rural households. In rural areas, 64.6 percent of households are experiencing a form of food insecurity, against 36.5 percent in urban areas.

Comparison of food security indicators with neighboring countries highlighted Niger' poor performance. Compared to its peers, Niger is performing poorly in relation to average dietary energy supply adequacy, share of dietary energy supply derived from cereals, roots and tubers, and access to basic drinking water serves (Table 14).

Figure 83. Distribution of food security categories
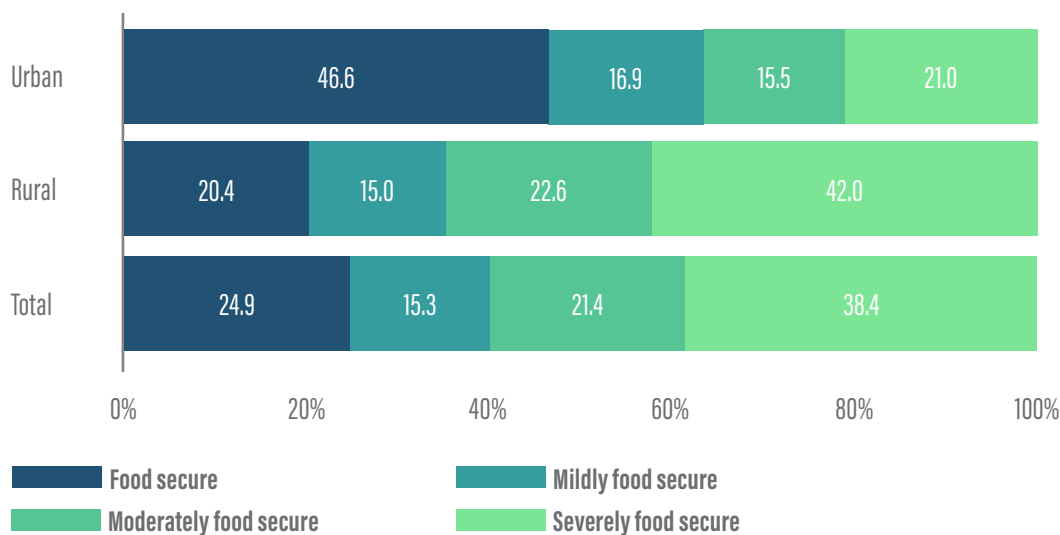
Source: World Bank staff calculation using data from EHCVM 2018/19

Table 14. Food security indicators across benchmark countries

	Average dietary energy supply adequacy	Share of dietary energy supply derived from cereals, roots and tubers	Gross domestic product per capita (in purchasing power equivalent)	Per capita food supply variability	People using at least basic drinking water serves (%)
Burkina Faso	122	64	2,190	30	48
Chad	95	62	1,580	31	39
Mali	135	68	2,327	36	78
Niger	121	62	1,219	40	50

Source: FAO (2020)
Note: These numbers generally refer to values for years between 2017 and 2019, with the share of dietary energy supply derived from cereals, roots and tubers reflecting the period 2015-17. Per capita food supply variability is the standard deviation of per capita food supply (in dietary energy) over the previous five years.

Household food security is generally better off in Niamey and Agadez regions. The Niamey region, which includes the capital city, is the region with the highest food security scores. At the opposite end of the distribution Maradi has the lowest score. Regions with highest monetary poverty rates tend to also be the one with the lowest food security. This point to affordability of food as being one of the possible causes of malnutrition. Of course, issues of availability of the food in the market could also be at play: the rarer, the higher the price.

Increasing levels of wealth are associated with greater food security while rural households, female headed ones, and those whose head is engaged in agriculture are the most likely to be food insecure. In effect results of a multivariate analysis (logistic model) support that wealthier households were the least likely to be food insecure as were households with access to asphalt road (Figure 85). In addition, households headed by individuals engaged in the agriculture sector or holding a secondary education degree had a higher likelihood of being food secure. Female headed households have a lower likelihood of being food secure. Residing in a rural area significantly increases the precarity of households' food security.

Figure 84. Average household food security across regions (0-8 scale, 0 = insecure and 8 = secure)
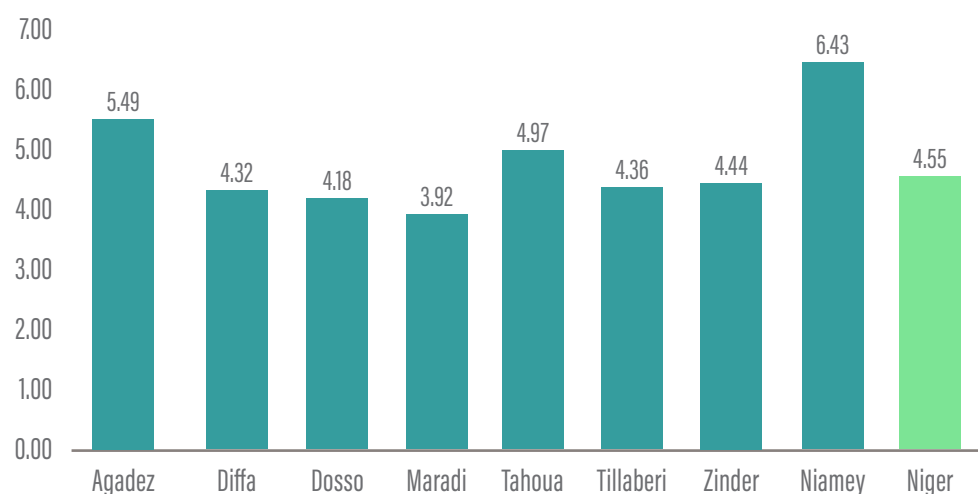
Source: World Bank staff calculation from EHCVM 2014 and EHCVM 2018/19.

Figure 85. Correlates of being food secure (logit marginal effects with 95% confidence intervals)
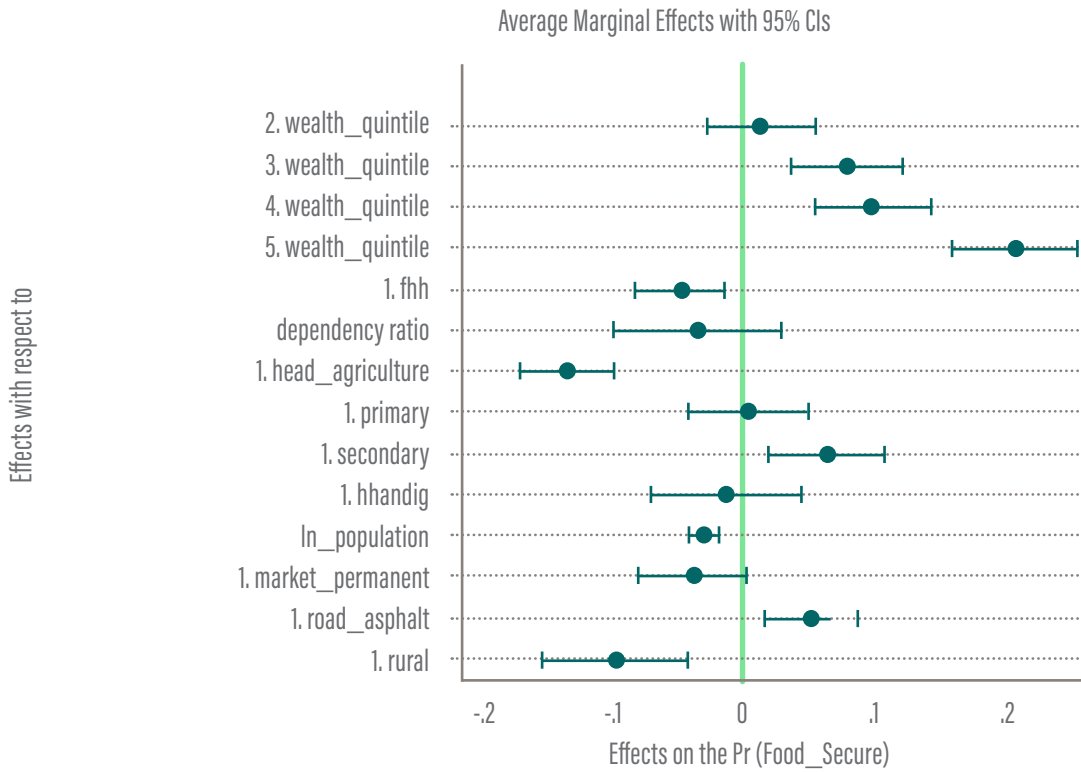
Source: World Bank staff calculation using data from EHCVM 2018/19

Notes: 'Dependency ratio' is the proportion of household members below 15 years or above 64 years old; 'Head – agriculture' is an indicator for the household head's main occupation being crop or livestock agriculture; 'Head – primary school' and 'Head – secondary school' are indicators for the household head's completion of some primary and secondary school; 'Head – handicap' is an indicator that the household head has a physical or mental handicap; 'Population (ln)' is the logged population size of the village or neighborhood; 'Permanent market' and 'Asphalt road' are indicators of the presence of a market or road in the village or neighborhood.

4.5. Conclusion

Performance on human capital is very low. To be successful, the fight against poverty should put a strong emphasis in building human capital. This chapter provides a diagnostic of the human capital index in Niger, with a focus on each of its sub-component: education, health, and food security. The HCI for Burkina Faso is estimated at 0.32, which indicates that a typical child born today can expect to attain only 32% of their productive potential as an adult. This is lower when compared to the Sub-Saharan Africa average (40%). The poor performance on education on health is driven by both supply and demand issues. For both girls and boys, family disavowal is by far the main reasons for never attending a formal. Deterioration of classrooms, and frequency of tuition fees are by far the most important problems raised by parents. When it comes to health service, evidence suggest that auto-medication may be at plays when it comes to adults and older people, they would opt to visit a health center only when the situation is very serious. Households mentioned long waiting time, lack of medicine, and high cost as key constrains in assessing health services. Due to poor productivity of agriculture, chronic food insecurity is prevalent in Niger, and the Covid-19 seems to have worsen the situation. If well designed, the fight against poverty, and the needed improvement of human capital will benefit from a nationwide pro-poor targeted social assistance program, that will help improve access to education and health service, and also boost agricultural productivity. But this should be coupled with improvement of the quantity and quality of services in these areas, including advisory services to farmers, improvement of quantity and quality of education and health services.

As illustrated in the literature, investment in early childhood development will have to be part of the package of investment designed to build human capital in the country. The benefits associated with intervening early on have being illustrated (Wodon 2017), with the right policies early in the lives of children, beginning with the provision of quality pre-natal services, and an emphasis on early childhood development. It is demonstrated that early childhood development improves academic performance, and developed other social skills (such as socialization, enthusiasm for lifelong learning, teamwork, resilience among others) that will prove critical in the society.

For those who are already in the active population, policy makers should consider the expansion of programs such as the Sahel Women's Empowerment and Demographic Dividend (SWEDD). SWEDD gives women and girls across West Africa vocational training so that they can earn more and have a better future. The project also strengthens girls' education, increases access to reproductive health services, and engages whole communities on issues including child marriage, human rights and gender equality. Given that poverty seems to affect men and women equally, variants of such program could be considered so as to benefit boys and men as well.

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ANNEX 1: TECHNICAL NOTE ON POVERTY MEASUREMENT BASED ON EHCVM 2018/19 DATA

The main objective of this Harmonized Living Conditions Household Survey (EHCVM) is to build capacity in the design, implementation, processing and analysis of survey data for poverty assessment. EHCVM 2018/10 data were collected in two waves, the first from September to December 2018, the second from April to July 2019. Each wave collected half the sample. The two-wave approach was chosen in order to take into account of the seasonality of consumption (both in terms of habits and levels of consumption).

Poverty measurement is the process of generating poverty indicators from survey data. Poverty measurement involves three steps: (i) constructing an indicator for measuring welfare; (ii) constructing a poverty line; and (iii) aggregating the data to produce poverty indicators. This note explains the methodological choices made for the measurement of poverty. The first section explains the approach used to construct the consumption aggregate since **the welfare indicator used is normalized annual per capita household consumption**. The second section explains the methodological approach used to construct the poverty line. The third section analyzes the transition from the consumption aggregate to the welfare indicator by applying different deflators. Lastly, initial results are briefly presented in the fourth section.

Figure A1.1 summarizes the components of poverty measurement.
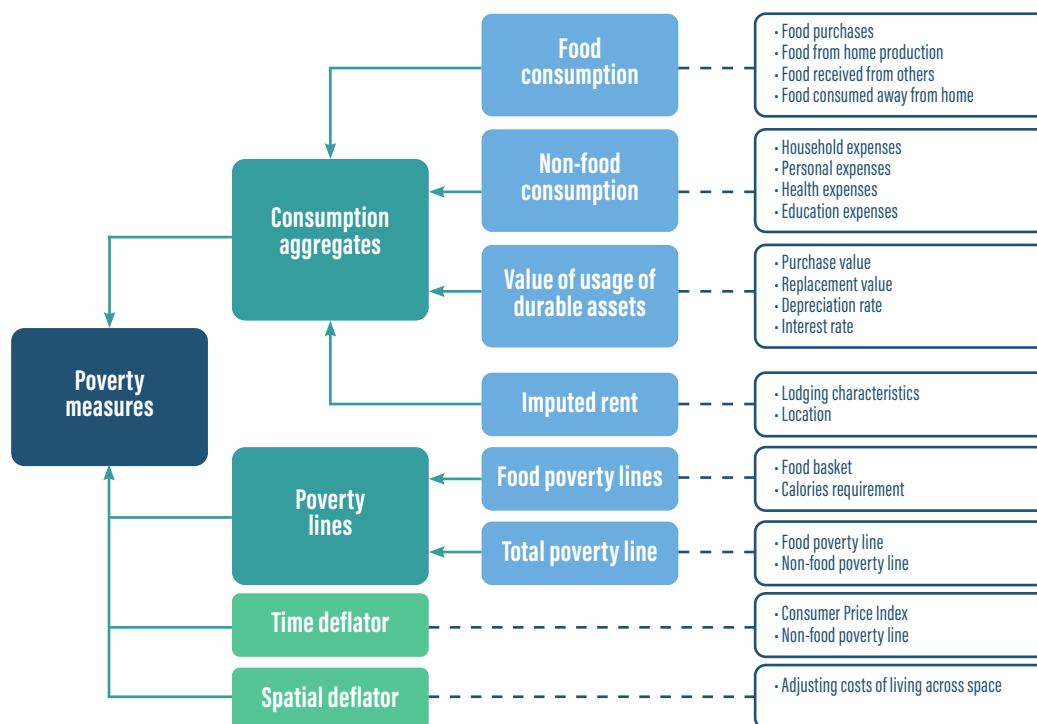
1. CONSUMPTION AGGREGATE

The consumption aggregate represents annual household consumption. It is calculated by aggregating food consumption, non-food consumption in non-durable goods and services, the use value of durable goods, and the imputed rent of owner-occupied and rent-free households.

Food consumption is measured over the last seven days (the reference period) preceding the enumerator's visit. It is the sum of household food consumption at home (purchases made and actually consumed, self-consumption of the household's own production, and gifts received and actually consumed) and meals taken away from home. In this survey, food consumption in the household is measured in quantities and meals taken outside the household are reported as values. Food consumption within the household is annualized by multiplying the quantities consumed by 365/7.

The trickiest question therefore concerns the valuation of household food consumption (purchases, auto-consumption and gifts). The survey is designed to use two price vectors: the unit values of the products purchased, and the prices recorded in the markets of the localities where the sampled households live. The first set of information (unit values) is available if the product was purchased by the household within 30 days prior to data collection. When a product was purchased during this period, in addition to providing information on consumption broken down into purchases, auto-consumption, and gifts, the questionnaire also provides information on the last purchase (quantity purchased and corresponding value), which makes it possible to derive the unit value of acquisition. If the product was purchased more than 30 days before the interviewer's visit, the value of the purchase is not provided and therefore no unit value can be obtained. Obviously if consumption of the product within the household comes exclusively from auto-consumption and gifts, no unit value is available either.

Moreover, since consumption is reported in non-standard units (NSU) during data collection, we must also find a way of converting these NSUs into standard units (SU) before applying prices. Obviously, if the data on NSUs is of average or poor quality, this also affects the quality of the consumption data obtained after valuation.

Three scenarios have been tested to value food consumption within the household

Scenario A: Unit values combined with market prices. For a given product, when a household purchased the product during the last 30 days prior to the enumerator's visit, the valuation of consumption (including auto-consumption and, if applicable, gifts) is calculated using the unit value of acquisition. In this case, there is generally no need to convert quantities into SUs provided the unit of acquisition and the unit of consumption are the same, which happened here in two thirds of cases. If the units are different, conversion to SUs is necessary before consumption can be valued.[17] For households that did not purchase the product within the last 30 days prior to data collection, valuation is based on market prices. This is done sequentially. Consumption is first valued using the average price calculated by regional and residential area; if the price is available at this geographical level for this product, the calculation ends. If the information is missing at the previous level, the average price calculated at the level of the Agro-Ecological Zone (AEZ) and place of residence is used.[18] If information is still missing at this level, the price calculated by place of residence (urban or rural) at the national level is used. If the information is missing at the previous level, the average price for the region is used followed by the average price for the AEZ, and finally the national price. It is important to note that all prices are calculated by wave. In other words, Wave 1 prices are not used to value the quantities of a household surveyed in Wave 2 and vice-versa.

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17   The data collected has the following characteristics: for two-thirds of all consumption observations, the unit of consumption and the unit of acquisition are the same (it is therefore not useful to use NSUs); for about 6 percent of all observations, the two units differ, and for 26 percent of all observations, only the unit of consumption is available as there have been no acquisitions in the last 30 days.

18   An AEZ consists of a grouping of regions. This variable was created to be used in the construction of poverty lines and has proved useful in that the use of a single region does not always give robust results because the number of observations may be too small.

Scenario B: Market prices only. In this case, consumption of a given product is first valued using the average price calculated for the region/residential area; if the price is available at this geographical level for this product, the calculation is ends. If the information is missing at the previous level, the average price calculated at the level of the Agro-Ecological Zone (AEZ)/ residential area is used. If information is still missing at this level, the price calculated by place of residence (urban or rural) at the national level is used. If the information is missing at the previous level, the average price for the region is used followed by the average price of the AEZ, and finally the national price. As before, it should be noted that all prices are calculated by wave. It is also important to note that if the choice is made to value quantities by market price, the conversion factors from NSUs to SUs must always be used.

Scenario C: Unit values only. This scenario consists of using unit values exclusively instead of prices. For a given product, when a household has acquired the product by purchase in the last 30 days before the survey agent's visit, the valuation of consumption (including auto-consumption and, if applicable, gifts) is calculated using the unit value of acquisition, as in Scenario A. For households that have not purchased the product in the last 30 days prior to collection, valuation is calculated using the unit values of households that have purchased the product. A vector of unit values is constructed using all possible combinations of product and unit of acquisition. The sequence of the quantity valuation process is the same as in the previous scenario, the only difference being that market prices are replaced by unit values. As information on the product or unit combination is used, conversion factors for converting NSUs to SUs are not needed.

Table A1.1 shows the breakdown of food consumption according to the different scenarios outlined above. The results show that valuation by unit values alone (Scenario C) yields food consumption levels close to the case where quantities are valued by a combination of unit value and market price (Scenario A, adopted in the Ouagadougou workshop conducted in January/February 2020). The difference between scenarios A and C in terms of median distribution is 2 percent in Niger. The difference between Scenarios B and C is extremely high at 94 percent.

From these results, it emerges that there is a choice between Scenarios A or C on the one hand and Scenario B on the other. A good indicator in making the decision is the share of food consumption in total consumption, depending on which scenario is chosen. The share of food consumption, including meals taken away from home, was 67% in Niger according to the EHCVM 2014 survey. These statistics are compatible with Scenarios A and C, where the share of food consumption (including meals taken away from home) is XXX percent for Scenario A and YYY percent for Scenario C. However, if Scenario B is used, the share of food consumption is abnormally high.

On the basis of these two assessment criteria, it follows that Scenario B should not be selected. Meanwhile, further work is being done using Scenarios A and C. Since the quantities valued are the same for all three scenarios, the weakness of Scenario B lies in the quality of the price data, which may not take sufficient account of differences in product quality. The other possible difficulty with Scenario B is the use of NSUs, another data source that necessarily introduces noise. This will play a role in the choice between Scenarios A and C. Since the latter has the advantage of not using NSUs, this is the scenario chosen here.

Table A1.1 Breakdown of per capita food consumption according to various price assumptions for valuing declared quantities

Scenarios	Consumption distribution			
	National average	1st quartile	2nd quartile	3rd quartile
A	133,448	70,668	103,126	157,432
B	254,040	86,433	137,646	251,765
C	130,624	69,098	100,908	153,150

Meals taken away from home. Consumption of meals taken away from home is given in terms of value for the last seven days before the interviewer's visit to the household. It is provided for each individual (for meals taken individually) and for the household as a whole for meals taken collectively by several household's members. The total value declared by the household is annualized by multiplying it by 365/7.

At the end of the above valuation process, consumption taken within the household is added to the meals taken away from home to give the total food consumption of the household.

Non-food consumption. Non-food consumption of non-durable goods and services (including education and health) is measured in value terms over a reference period of 7 days, 30 days, 3 months, 6 months, and 12 months depending on the anticipated frequency of consumption of each type of good. The value reported during the reference period is multiplied by a factor taking into account the frequency, or 365/7, 12, 4, 2, and 1, respectively. The important point is to define durable goods as well as exceptional expenditure in order to exclude them in the aggregation of non-food consumption. Durable goods are defined as means of transportation (car, motorcycle, bicycle, etc.), household appliances (television, refrigerator, freezer, oven, washing machine, dishwasher, air conditioner, music system, radio, fans, etc.), large pieces of furniture (sofa and armchair set, dining table and chairs, bookcase, other cupboards, etc.), and electronic appliances and other goods (computer, telephone, mobile phone, cameras, musical instruments such as guitar or piano, motorized gardening equipment, valuable jewelry and watches, carpets, etc.). These goods

are excluded from the calculation of food consumption and will be calculated by use value instead. Expenditure on festivities and ceremonies as well as pilgrimages, which are considered exceptional expenditure, are also excluded. The only case in which holiday expenditure is used is for expenditure on clothing and footwear for religious holidays such as Christmas, New Year, Easter, end of Ramadan, Tabaski, etc. The reason for this choice lies in the fact that the clothing acquired during these holidays is real household consumption and not prestige or conspicuous expenditure, which amounts to a transfer to other households. It is also important to stress the classic debate over whether expenditure on education (school fees, costs of supplies, etc.) and health (consultations, medical examinations, medication, hospitalization) constitutes investment in human capital or consumption. The choice was made to include them, as has long been the practice in WAEMU member countries. Nevertheless, expenditure on therapeutic medical devices (crutches, wheelchairs, dentures, prescription glasses, etc.) was excluded from the consumption aggregate. Even if these items were to be included, they would be treated like durable goods.

Use value of durable goods. Durable goods are those that render services to the household over a long period of time after their acquisition. For these goods, the use that is made of them is considered consumption by the household. It is therefore necessary to estimate this consumption, which is called "use value." All goods regarded as durable goods have been defined above. In addition, real estate (land, buildings) and goods mainly intended for economic production (dugout canoes and outboards, hunting rifles, etc.) were ignored.

For goods regarded as durable, the use value is a function of the acquisition value, the age of the goods, the inflation rate, the real interest rate, and economic depreciation. The acquisition value and the age of the good were provided during the survey, an annual inflation rate of 1% and a real interest rate of 2% were used for all durable goods, and the only unknown parameter was the depreciation rate. For each good and each household owning it, if *vrempla* is the value of the asset replacement cost, vacqui is the acquisition value, and age the age of the asset in whole years, the formula for calculating the depreciation rate (*depret*) is as follows:

$$depret = 1 - \left(\frac{vrempla}{vacqui}\right)^{1/age}$$

The median depreciation rate (*mdpret*) of the asset for all households is then calculated. Finally, if *s12q03* is the number of goods of a given type owned by the household and *s12q08* is the acquisition price of such goods, the use value of a given good (*depan*) is obtained by applying the following formula:

$$depan = s12q03 * s12q08 * (1.01^{age}) * (mdpret + 0.02)$$

The sum of this variable (*depan*) for all assets owned by a household provides the aggregate of the use value of the household's durable goods.

It is important to note that adjustments are made to the data before calculation: (i) for goods less than one year old, age was assumed to be 0.5; (ii) for goods older than 20 years (less than 3% of observations), age was limited to 20 years; (iii) when the number of goods was not reported and other information was present, the number of observations of the good was imputed by the mode value; and (iv) the acquisition value of outliers was adjusted before proceeding with the calculations (see adjustment of outliers below).

Imputed rent of owner-occupied households. The final component of the consumption aggregate is the imputed rent of owner-occupied and rent-free households. For households, housing is an investment good; when a household has built a dwelling, it consumes it by occupying it. The general approach for estimating imputed rent is the econometric approach. In some cases, where the number of observations was too small, an alternative approach was chosen, which is explained below.

The econometric approach is based on the following principle: since some households are renters, a hedonic housing function is estimated for these households, and this function is used to impute a notional rent to owner-occupied and rent-free households. The explained variable of the model is the logarithm of the rent, the explanatory variables typically being: type of dwelling, number of rooms, type of walls, type of roof, type of floor, type of toilet, presence of electricity in the dwelling, presence of running water in the dwelling, mode of garbage disposal, mode of sewage disposal, and other community variables such as the existence of a paved road in the locality, the most common mode of transportation in the locality, etc. The model is estimated using the stepwise procedure, which consists of gradually introducing the variables into the model and retaining only those that are significant.

To account for differences in the housing market, the model is estimated separately for the country's capital city, other urban areas, and rural areas. In the capital and other urban areas, the econometric approach is systematically implemented. In rural areas, the housing market is tight, as shown by the low number of renter households in the samples. There are only 43 households with rental value in rural Niger. Thus, the econometric approach cannot produce satisfactory results in rural areas. An alternative approach is used. This consists of calculating the median rent of tenants according to the number of rooms, and this rent is imputed to owner-occupied households occupying a dwelling with the same number of rooms. Here, given the small number of tenant households, the number of rooms variable is recoded into three modalities, for example (1 room, 2 rooms, and 3 or more rooms)

Table A1.2. Comparison of actual rent and imputed rent

	Actual rent					Imputed rent				
	# Obs	Min	Median	Mean	Max	# Obs	Min	Median	Mean	Max
Capital	278	18,000	300,000	386,171	1,697,054	418	44,394	354,384	442,114	2,169,331
Other urban areas	185	18,000	180,000	185,503	1,440,000	696	44,614	140,362	202,460	2,283,217
Rural areas	27	24,000	120,000	154,049	360,000	4,420	60,000	127,278	150,000	150,000

A type of validation was conducted by comparing the distributions of actual and imputed rents, and the results are shown in Tables A2, which cover the country's capital city, other urban areas, and rural areas, respectively. The comparison between actual and imputed rents shows quite significant differences in the capital. At median level, the gap is 42% in Niger. However, this difference does not always suggest that the adjustment is bad. Indeed, if, for example, the characteristics of owners' houses are better than those of renters, the difference is justified. A simple test of averages was carried out in the case of Niger, and it appears that in the capital (Ouagadougou), houses occupied by owner-occupied households are on average of better quality than those occupied by renters. Differences can also be justified by the fact that the fit of the model is not always very good; for example, surveys do not take into account the quality of the materials used to construct dwellings, and disparities in quality are greater in capital cities. Imputed rent estimates are of better quality in the rest of the urban area and in rural areas, at least if quality is measured as the differences between actual and imputed rent. In urban areas, Table A1.2 shows that the median imputed rent is 23% lower than actual rent in urban areas. For rural areas, the difference is 6 percent only.

Outlier adjustment. It is always difficult to distinguish between what is an outlier (abnormally high or abnormally low value) and what is simply an atypical value. Improper outlier adjustment can reduce real inequalities in the population. For this reason, adjustments should be made with caution. Here, adjustments were made in two stages: abnormally low values, and abnormally high values. Values that are too low are defined as zero food or zero non-food consumption. Household consumption was calculated according to four main consumption functions: (i) food consumption, including meals taken away from home; (ii) non-food consumption without use value of durable goods and imputed rent; (iii) use value of durable goods; and (iv) imputed rent. Households with a zero *i* or a zero *ii* component were removed from the databases. The logic is simple: it is unlikely that a household has zero food consumption; rather, this household did not complete the interview (in cases of a one-person household, where the householder is often absent) or refused to complete it. Similarly, a household cannot have zero annual non-food consumption, whatever its standard of living. It is necessary to buy even basic goods for everyday consumption (household soap, matches, etc.). As a second step, an adjustment was made for abnormally large values. Contrary to the previous case, this adjustment is made per consumption item. The logarithm of the consumption and the interquartile range are then calculated. A value was considered abnormally large if it is greater than the median of the logarithm of consumption plus 2.5 times the interquartile range (this value is called the "maximum allowed"). These values are adjusted by replacing the value with the maximum allowed (or "trimming"). This choice is made to minimize the impact on inequality.

2. POVERTY LINE

The poverty line is the value of the welfare indicator that allows individuals to satisfy their minimum vital needs. The approach used to construct the poverty line is that of the cost of basic needs[19]. A poverty line is constructed in two steps: (a) calculating the food poverty line; (b) deriving a total poverty line by applying to the food line a share of non-food expenditure.

With regard to the food poverty line, a basket of food items providing each individual with 2,300 kilocalories (which is within the range of the internationally accepted standard for food consumption) is determined. The valuation of this basket provides the food poverty line. Three factors are important in carrying out this task: (i) the reference population for determining the basket; (ii) how the basket is constructed; and (iii) the price vector used to value the basket.

On the first point, the reference population must be households around the poverty line. The objective is to have a reference population that has, as much as possible, the consumption habits of households that are neither too poor nor too well-off. Given that the poverty lines are around 40% in the subregion, the interval from the second to third and the seventh to eighth decile is an acceptable range. Deciles 3 to 8 were used for all countries.

Having adopted a reference population, a national basket was constructed covering 85% of the most consumed food products in this reference population, excluding meals away from home[20]. The basket was constructed based not on nominal expenditure but on annual expenditure for each product adjusted by the spatial deflator (see the calculation of the spatial deflator in Section 3). This ensures that differences in prices do not affect the procedure for constructing the poverty line. Before finalizing the basket, it was verified that it represented at least 70% of the food consumption in each region or Agro-Ecological Zone (AEZ). To obtain the food line, the basket was valued using unit values from the consumption records, the same unit values that were used to value food consumption. These unit values are filled in during the survey as different non-standard consumption units (bottle, basin, plate, heap, etc.). The unit values collected in NSUs are then converted to SUs using the conversion factors from the NSU survey that took place before the main data collection.

Two non-food poverty lines were calculated, and these led to two overall poverty lines. However, the non-food poverty lines were not calculated directly; instead the total poverty line is calculated using the share of food consumption of households around the food poverty line. The first option consists of determining the non-food component of the poverty line as the share of non-food consumption of households whose total consumption is equal to the poverty line. The second is to determine the non-food component of the food poverty line as the share of non-food consumption of households whose food consumption is equal to the food poverty line. The second solution clearly gives a higher value than the first.

19   Ravallion, Martin. 1998. Poverty lines in theory and practice (English). Living standards measurement study (LSMS) working paper ; no. LSM 133. Washington, D.C. : The World Bank.

20   Meals taken outside of the household cannot be used in the construction of the poverty line. The reason is that the process requires a correspondence between quantities consumed and calorie intake, and this information is not available for meals taken outside.

Table A1.3. Assumptions Used in the Construction of Poverty Lines

	Deciles of reference population	Quantity of kilocalories of consumption	Approach to calculating poverty line	Minimum spatial deflators	Maximum spatial deflators	Gini without outlier adjustment	Gini with outlier adjustment
Niger	3 to 8	2300	average	0.896	1.259	0.401	0.382

For the first of the two poverty lines (*zref_min*), households around the food poverty line are defined as those with total consumption within plus or minus 10% of the food poverty line; if there are no households in this range, households within plus or minus 20% of the food poverty line are used. If we call zali the previously calculated food poverty lines, and *alpha_min* the share of household food consumption whose total per capita consumption is just equal to the food poverty line as defined above, the minimum poverty line is given by:

$$zref_{min} = zali * (2 - alpha\_min)$$

For the second of the two thresholds (zref_max), households around the food poverty line are defined as those with food consumption within plus or minus 10% of the food poverty line; as before, if there are no households in this range, households falling within plus or minus 20% of the food poverty line are used. If we call alpha_max the share of household food consumption whose per capita food consumption is just equal to the food poverty line as defined above, the maximum non-food poverty line is given by:

$$zref_{max} = zali/alpha\_max$$

3. HOUSEHOLD COMPOSITION, TEMPORAL AND SPATIAL DEFLATORS, AND INDICATORS OF WELFARE

The consumption aggregate is not an indicator of welfare because it does not allow for a fair comparison between households. Households are of different sizes and compositions and face different prices depending on when the data was collected and where household members live. The welfare indicator must therefore take all these factors into account.

Household composition and size. The first element to consider is the size and composition of households. Here, household composition was ignored and only size was taken into account. Household composition should be reflected by an equivalence scale, and there is no consensus regarding the best approach to deriving an equivalence scale. Moreover, virtually all countries concerned have adopted the practice of only taking household size into account. Thus the consumption aggregate is divided by household size to yield annual per capita consumption. Nevertheless, for the purpose of carrying out sensitivity tests such as ranking regions in terms of poverty levels, two equivalence scales were calculated since it is easy to produce poverty figures using either one.

Time deflator. The second element to consider is the time at which the data is collected in the household. Nine months elapsed between the start of data collection and completion of this process. Data collection for the first wave took place in several of the countries immediately following the harvest, and data collection for the second wave took place in the period well away from the harvest. During the collection period, consumer prices changed. Consumption was normalized using a time index. To do this, the national household final consumer price index is an effective tool. WAEMU countries have regional indices that could have been used as part of this process, but their coverage is limited as they tend to focus on country capitals, with secondary cities and rural areas less well represented. In fact, some countries collect regional prices for the purpose of calculating the national index but do not calculate purely regional indices. As a result, there is some uncertainty regarding the quality of these regional indices, and the national index is more reliable.

To calculate time deflators, if we call IPC_i the consumer price index at month i, i=1, ..., n the period of n collection months, we can calculate IPC as the average index during the collection period by:

$$IPC = \frac{1}{n}\sum_i^n IPC_i$$

The time deflator for each collection month is given by:

$$\text{def}\_temp_i = IPC_i / IPC$$

It was pointed out above that the time deflator is applied to the annual consumption of each product before the construction of the poverty line. Thus, for a household k surveyed in month i, the annual expenditure of product m (*depan*) is normalized by the following formula:

$$depan'_{kim} = \frac{depan_{kim}}{\text{def}\_temp_i}$$

Spatial deflator. It is advisable to also apply a spatial deflator so as to take into account disparities in the cost of living between different regions and localities in the country. A natural candidate is the regional price index, or at least the prices underlying these calculations. However, as noted above, prices collected at regional level show low coverage of small urban centers and rural areas. A test was conducted in order to use these as a deflator. As poverty rates of over 70% were obtained in some countries, the idea was abandoned. The poverty lines constructed by AEZ and area of residence were used as spatial deflators. The approach to constructing poverty lines by AEZ and area of residence was the same as that for constructing the national poverty line and the same national basket was used. This basket was valued using the average unit values of the AEZ and areas for the food poverty line. The non-food poverty line was also constructed by AEZ and area using the same approach as above. In other words, for the non-food poverty line, given that the average of the minimum and maximum poverty lines was used as the non-food poverty line, the same approach was followed. Clearly, in the case of Côte d'Ivoire, where the minimum poverty line at the national level was used, the minimum poverty line by AEZ and area was also used. If we call *zzaej*

the poverty line of the AEZ and areas j, *def_spa* the spatial deflator of the AEZ and areas j is the ratio of the threshold of AEZ or area j to the national threshold:

$$IPC = \frac{1}{n}\sum_i^n IPC_i$$

Finally, for a household k surveyed in month i and belonging to AEZ/area of residence j, if we call dtotk the total annual consumption of the household and *hhsizek* the household size, the welfare measure indicator is:

$$pcexp_k = \frac{dtot_k}{(\text{hhsize}_k * \text{def}\_temp_i * \text{def}\_spa_j)}$$

4. SYNTHESIS OF RESULTS

The indicator of poverty easiest to calculate is the incidence of poverty, which is the percentage of people living below the poverty line. The incidence of poverty depends on the chosen poverty line. Each country should have a national poverty line. This line is important for monitoring and evaluating public policies to combat poverty in the country. The line depends on national standards, including consumption preferences and the cost of living. The incidence of poverty according to the national poverty line is that used for poverty diagnoses in national documents such as development plans or poverty reduction strategies. However, this poverty incidence is not directly comparable with that of any other country because it depends on the national poverty line, which takes into account specific norms and preferences.

For international comparisons and the monitoring of the Sustainable Development Goals (SDG), international poverty lines are more appropriate. The extreme poverty line is US$1.90 per person per day at 2011 purchasing power parity (PPP). Here, this line was converted in FCFA taking into account the increase in the cost of living as measured by inflation between 2011 and 2018. It is important to note that the first SDG target (Eradicating Extreme Poverty by 2030) uses the above extreme poverty line.

Table A1.4: Poverty measures

	Nominal per capita expenditure	Real per capita expenditure	National poverty line	Poverty rate – National	Poverty rate – Urban	Poverty rate – Rural	International poverty rate ($1.90 2011 PPP)	Gini Index	Inequality index P90/P10
Niger	259012.5	263225.7	181781.6	40.8	11.8	46.8	41.2	0.350	8.62

The main results are shown in Table A4. This table shows the welfare indicator level as standardized annual per capita consumption, the incidence of poverty according to the selected thresholds, and inequality indicators.

Columns 2 and 3 of Table 4 show per nominal capita consumption and real per capita consumption, respectively. The difference between these two variables is that they take into account differences in the cost of living between localities in each country. The reference is the national level. The fact that nominal per capita consumption is higher than real per capita consumption in most countries suggests that the cost of living is relatively higher in localities where nominal consumption is highest (notably capital cities and major urban centers). Columns 4 to 7 show the national poverty results, the poverty line, and the poverty rates for the country as a whole and for urban and rural areas in particular. Column 8 illustrates the international poverty rate at $1.90 per person per day at 2011 PPP prices. Columns 10 and 11 provide two measures of inequality: the Gini index, and the ratio of average per capita consumption of the richest 10% to that of the poorest 10%.

The EHCVM survey is important for Niger. The survey was designed not only to produce poverty indicators but, more importantly, to generate data for in-depth analytical work designed to assess poverty in its many dimensions. On the basis of the production of the poverty figures, one of the objectives of the project has been achieved; it is now a matter for the countries concerned to add value to the data. Nevertheless, it is important to stress that survey data is never perfect, especially in African countries, where the level of literacy remains average. In this project, the price data is of average quality. An assessment of the survey will allow for lessons to be learned from this first round in the work in order to improve the next one.

ANNEX 2: RECONSTRUCTION OF POVERTY ESTIMATES IN 2014 TO OBTAIN COMPARABLE POVERTY TREND BETWEEN 2014 AND 2018

The Niger EHCVM 2018/19 is part of the joint effort between the World Bank and the WAEMU Commission to conduct new nationally-representative household surveys in each of the 8 WAEMU member countries. For Niger, the advantages of the newly introduced survey, EHCVM 2018/19, are threefold: (i) it follows international standards for poverty measures, (ii) it is comparable to the same household surveys conducted in other WAEMU countries, and (iii) it will be comparable to the next EHCVM survey planned in 2021/22. While the EHCVM 2018/19 is comparable to the previous survey, EHCVM 2014, in terms of survey design and implementation, there is a major break of comparability of the methodology to calculate consumption aggregates.

Thus, to obtain comparable poverty estimates between 2014 and 2018, we applied the 2018 methodology as described in Annex 1 to recalculate Nigerien household consumption aggregates in 2014. We also used the same poverty line in 2018 at 2014 prices based on the official CPI.

Table A2.1. Poverty trend

	2014 official			2014 reconstructed for comparability			2018 official		
	Headcount	Depth	Severity	Headcount	Depth	Severity	Headcount	Depth	Severity
National	44.1	13.1	5.4	46.2	14.7	6.3	40.8	11.2	4.3
Urban	8.6	1.4	0.4	8.0	1.4	0.4	11.8	2.4	0.7
Rural	51.0	15.4	6.3	53.7	17.2	7.5	46.8	13.0	5.0

Table A2.2. Household budget share from the reconstructed data based on EHCVM 2014

Category	Food	Health	Education	Rent	Housing	Transportation	Durable assets	Personal/ household items	Other
National	50.6%	9.9%	1.4%	3.6%	6.3%	5.7%	4.7%	10.0%	4.3%
Urban	40.0%	6.6%	2.9%	8.9%	9.1%	8.3%	6.8%	9.2%	3.5%
Rural	57.8%	12.0%	0.4%	0.1%	4.3%	3.9%	3.3%	10.6%	4.9%
Agadez	56.0%	4.6%	1.7%	3.1%	5.6%	7.2%	4.7%	8.8%	4.0%
Diffa	63.7%	4.9%	0.5%	4.7%	4.8%	1.8%	3.0%	8.8%	4.0%
Dosso	53.8%	7.7%	1.2%	2.0%	6.2%	5.3%	4.2%	11.7%	5.2%
Maradi	57.4%	6.0%	0.8%	2.1%	3.8%	5.3%	2.9%	12.2%	6.4%
Tahoua	55.8%	7.3%	0.8%	2.3%	6.0%	5.1%	3.2%	11.3%	4.4%
Tillaberi	47.3%	25.9%	0.4%	0.6%	5.5%	2.3%	5.0%	8.0%	2.9%
Zinder	55.0%	8.9%	0.7%	1.8%	5.3%	4.4%	4.0%	10.5%	5.7%
Niamey	34.9%	5.4%	4.1%	10.7%	10.2%	10.8%	8.4%	8.4%	2.6%

Table A2.3. Household budget share from the official data EHCVM 2018/19

Category	Food	Health	Education	Rent	Housing	Transportation	Durable assets	Personal/ household items	Other
National	57.8%	3.5%	1.0%	9.7%	9.9%	4.5%	4.1%	6.1%	3.2%
Urban	48.2%	3.5%	2.6%	8.5%	12.5%	7.6%	7.0%	6.8%	3.4%
Rural	62.9%	3.5%	0.3%	10.4%	8.5%	2.9%	2.6%	5.8%	3.2%
Agadez	53.4%	3.0%	1.0%	8.3%	12.1%	6.5%	5.4%	6.5%	3.8%
Diffa	60.0%	3.1%	0.5%	9.1%	9.6%	3.5%	2.7%	7.2%	4.2%
Dosso	59.5%	4.5%	0.6%	9.6%	9.7%	3.2%	2.9%	6.8%	3.3%
Maradi	60.6%	3.0%	0.9%	10.2%	9.1%	3.4%	3.8%	5.7%	3.2%
Tahoua	60.6%	3.8%	0.4%	9.6%	8.8%	4.2%	3.3%	5.9%	3.5%
Tillaberi	61.7%	4.4%	0.6%	9.3%	9.2%	2.9%	3.1%	5.6%	3.2%
Zinder	63.1%	2.9%	0.4%	10.3%	8.5%	3.1%	3.0%	5.7%	3.0%
Niamey	42.2%	2.9%	3.5%	9.9%	13.6%	9.7%	8.1%	7.1%	2.9%

ANNEX 3: CONSTRUCTION OF MULTI-DEPRIVATION INDEX

The Multidimensional Poverty Index (MPI), launched by the United Nation's Development Program's Human Development Reports Office in 2010, is designed to quantify and measure nonmonetary dimensions of poverty. The original concept has three dimensions (Health, Education and Standard of living) and 10 indicators: (1) Nutrition; (2) Child Mortality; (3) Years of Schooling; (4) School Attendance; (5) Cooking Fuel; (6) Sanitation; (7) Drinking Water; (8) Electricity; (9) Flooring; and (10) Asset Ownership. However, its components may vary across countries as they can be affected by public policies and data availability.

The MPI for Burkina Faso includes 15 and 16 dimensions, respectively. They are grouped into six broad categories: education, childhood and youth, health, access to basic services, housing conditions, and asset ownership. Each of the categories has a weight of 0.166, which is distributed evenly across the dimensions within each category. Table 1 shows all the dimensions of the index. Many dimensions are household-based: if the household is deprived in any of the dimensions, all household members are considered deprived. The cross-dimensional cut-off is 0.40; that is households are considered multi-dimensionally poor if the weighted sum of deprivation scores is larger than 0.40.

The proportion of the population that is multidimensionally poor is the incidence of poverty, or headcount ratio (H). The average proportion of indicators in which poor people are deprived is described as the intensity of their poverty (A). The MPI is calculated by multiplying the incidence of poverty by the average intensity of poverty across the poor (MPI = M0 = H x A); as a result, it reflects both the share of people in poverty and the degree to which they are deprived.

Table A3.1. Categories and dimensions of the Burkina Faso and Niger multidimensional poverty index

Category	Dimension	Deprived if
Education	Educational achievement	None of the household members 15 years or older has completed six years of schooling (primary completed).
	Literacy	Any person older than 15 years or older in a household is illiterate.
Childhood and youth	School attendance	Any child 6 to 14 years old does not attend school.
	Children behind grade	Any child 7 to 17 years old is behind the normal grade for his/her age.
	Child labour	Any child 7 to 17 years old works.
Health	Waste management	Household employs unrecommended waste management methods such as incinerate, burn, and stock in nature.
	Health services (*Not available for Burkina Faso)	Any person who fell sick or ill in the last 30 days did not receive specialized health services.
Access to Basic services	Cooking fuel	Household uses solid fuels and/or solid biomass fuels for cooking, such as charcoal, wood, straw, shrubs, grass, agricultural crop, and animal waste.
	Drinking water	Household does not have access to improved drinking water (according to the SDG guideline) or safe drinking water is at least a 30-minute walk from home (roundtrip).
	Sanitation	Household's sanitation facility is not improved (according to the SDG guideline) or it is improved but shared with other households.
	Electricity	Household has no electricity, generator, or solar panel.
Housing conditions	Floor	Household has floors made of natural or rudimentary materials such as mud, wood, straw, metal sheet, sand, and animal wastes.
	Wall	Household has walls made of natural or rudimentary materials such as wood, metal sheet, sand, animal wastes, and straw.
	Roof	Household has roofs made of natural or rudimentary materials such as mud, straw, rustic mat, wood planks, reused wood, and unburnt bricks.
	Overcrowding	There are more than 3 people per sleeping room.
Assets ownership	Assets ownership	Household does not own more than one of: radio, gas/electric cooker, standing fan, TV, satellite dish/decoder, generator, telephone, bike, motorbike, refrigerator, or computer and does not own a car or truck.

Table A3.2. MPI results for Niger in 2014, national and regional

	National	Agadez	Diffa	Dosso	Maradi	Tahoua	Tillaberi	Zinder	Niamey
H	0.902	0.771	0.910	0.950	0.953	0.922	0.957	0.968	0.249
M0	0.696	0.576	0.724	0.735	0.761	0.727	0.708	0.743	0.142
Number of observations	22,667	2,241	2,021	2,631	3,002	2,563	2,667	3,135	4,407

Table A3.3. MPI results for Niger in 2018, national and regional

	National	Agadez	Diffa	Dosso	Maradi	Tahoua	Tillaberi	Zinder	Niamey
H	0.860	0.671	0.886	0.913	0.884	0.906	0.904	0.912	0.222
M0	0.606	0.431	0.623	0.608	0.646	0.637	0.634	0.658	0.126
Number of observations	35,393	3,375	3,546	3,948	5,752	4,608	4,927	5,459	3,778

Table A3.4. Result of sensitivity test to the value of the cutoff, for Niger

k = Cutoff	k = 1/15	k = 2/15	k = 3/15	k = 4/15	k = 5/15	k = 6/15	k = 7/15	k = 8/15	k = 9/15	k = 10/15	k = 11/15	k = 12/15	k = 13/15	k = 14/15
H: 2014	0.992	0.978	0.969	0.947	0.926	0.902	0.869	0.832	0.767	0.706	0.579	0.418	0.284	0.103
H: 2018	0.988	0.969	0.956	0.922	0.897	0.860	0.817	0.772	0.664	0.545	0.374	0.203	0.101	0.025
H: Change from 2014 to 2014	-0.004	-0.009	-0.014	-0.024	-0.030	-0.043	-0.052	-0.061	-0.104	-0.161	-0.206	-0.215	-0.183	-0.077
M0: 2014	0.720	0.718	0.717	0.711	0.705	0.696	0.682	0.663	0.626	0.588	0.499	0.376	0.265	0.101
M0: 2018	0.639	0.637	0.635	0.627	0.619	0.606	0.587	0.564	0.503	0.428	0.308	0.177	0.092	0.024
M0: Change from 2014 to 2018	-0.081	-0.081	-0.082	-0.084	-0.086	-0.091	-0.095	-0.099	-0.124	-0.160	-0.191	-0.199	-0.173	-0.077

Figure A3.1. Result of sensitivity test to the value of the cutoff, for Niger
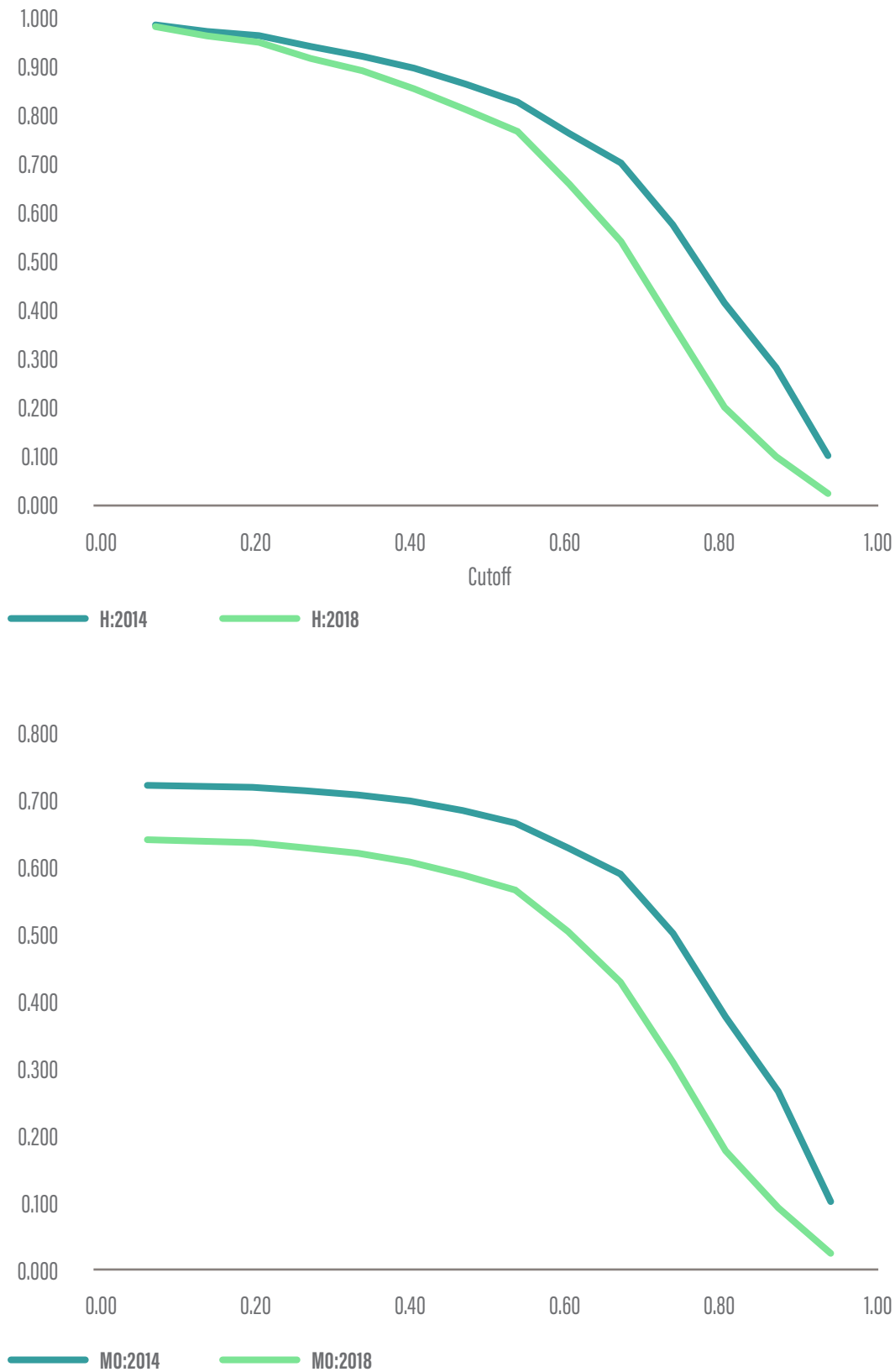
ANNEX 4. DECOMPOSITION RESULTS

Table A4.1. Growth and redistribution decomposition of poverty changes in Niger between 2014 and 2018

Change in poverty headcount	2014	2018	Actual change	Growth	Redistribution	Residual
National	46.2	40.8	-5.4	-2.9	-2.5	0.0
Urban	8.0	11.8	3.8	-1.0	4.9	0.0
Rural	53.7	46.8	-6.9	-2.7	-4.2	0.0

Table A4.2. Non-linear Oaxaca-Blinder decomposition of poverty change in Niger between 2014 and 2018

Overall	Total	Endowment	Return to endowment	Interaction
Poverty rates in 2018	0.408***			
	(0.000)			
Poverty rates in 2014	0.463***			
	(0.000)			
Change in poverty rates	-0.054***			
	(0.000)			
Endowments	0.002***			
	(0.000)			
Coefficients	-0.059***			
	(0.000)			
Interaction	0.003***			
	(0.000)			
Rural		-0.000***	-0.187***	-0.002***
		(0.000)	(0.001)	(0.000)
Agadez		0.000***	0.011***	0.001***
		(0.000)	(0.000)	(0.000)
Diffa		0.000***	0.002***	0.000***
		(0.000)	(0.000)	(0.000)
Dosso		-0.000*	0.002***	0.000*
		(0.000)	(0.000)	(0.000)

Overall	Total	Endowment	Return to endowment	Interaction
Maradi		-0.000***	0.004***	-0.000***
		(0.000)	(0.000)	(0.000)
Tahoua		0.000***	0.032***	0.001***
		(0.000)	(0.000)	(0.000)
Tillaberi		0.000***	0.017***	0.000***
		(0.000)	(0.000)	(0.000)
Zinder		-0.000***	0.011***	-0.001***
		(0.000)	(0.000)	(0.000)
Number of kids age 0-5		0.001***	0.030***	-0.002***
		(0.000)	(0.000)	(0.000)
Number of kids age 6-14		-0.005***	0.029***	0.005***
		(0.000)	(0.001)	(0.001)
Number of adults age 15-64		-0.001***	0.007***	0.001***
		(0.000)	(0.001)	(0.000)
Number of adults age 65+		-0.000***	-0.010***	-0.002***
		(0.000)	(0.000)	(0.000)
Gender of head: Female		-0.000***	0.009***	-0.002***
		(0.000)	(0.000)	(0.000)
Age of head		0.001***	0.134***	0.005***
		(0.000)	(0.001)	(0.001)
Marital status of head: Never married		-0.000***	0.002***	0.002***
		(0.000)	(0.000)	(0.000)
Marital status of head: Widowed/Divorced/Separated		-0.001***	0.000***	-0.002***
		(0.000)	(0.000)	(0.000)
Head having health problem		0.000***	-0.001***	-0.000***
		(0.000)	(0.000)	(0.000)
Number of family members with no education		0.000***	0.055***	0.006***
		(0.000)	(0.001)	(0.001)
Number of family members with primary education		0.000***	-0.010***	-0.000***
		(0.000)	(0.000)	(0.000)
Number of family members with secondary or above education		(dropped)	(dropped)	(dropped)
Education of head: Primary		0.000***	-0.002***	0.000***
		(0.000)	(0.000)	(0.000)
Education of head: Secondary or above		-0.000***	0.006***	-0.001***
		(0.000)	(0.000)	(0.000)
Ownership of house		-0.000***	-0.021***	-0.001***
		(0.000)	(0.001)	(0.000)
Ownership of TV		0.001***	0.013***	0.001***
		(0.000)	(0.000)	(0.000)

Overall	Total	Endowment	Return to endowment	Interaction
Ownership of fan		0.000	-0.031***	-0.000***
		(0.000)	(0.000)	(0.000)
Ownership of radio		0.003***	0.021***	0.008***
		(0.000)	(0.000)	(0.001)
Ownership of motorbike		-0.001***	-0.006***	0.001***
		(0.000)	(0.000)	(0.000)
Ownership of phone		-0.001***	-0.007***	0.001***
		(0.000)	(0.000)	(0.000)
Walls with improved materials		0.003***	-0.010***	0.014***
		(0.000)	(0.000)	(0.002)
Roofs with improved materials		-0.001***	0.001***	-0.000***
		(0.000)	(0.000)	(0.000)
Floor with improved materials		-0.000***	-0.001***	0.000***
		(0.000)	(0.000)	(0.000)
Access to electricity		0.000***	-0.008***	-0.000***
		(0.000)	(0.000)	(0.000)
Access to drinking water		0.000***	-0.044***	0.007***
		(0.000)	(0.000)	(0.001)
Access to improved sanitation facility		0.001***	0.011***	0.003***
		(0.000)	(0.000)	(0.000)
Access to improved waste management		0.000***	-0.008***	0.003***
		(0.000)	(0.000)	(0.000)
Having family shock		0.001***	-0.002***	0.003***
		(0.000)	(0.000)	(0.000)
Having natural disaster shock		-0.000	0.008***	-0.001***
		(0.000)	(0.000)	(0.000)
Having economic shock		-0.001***	-0.032***	-0.011***
		(0.000)	(0.000)	(0.002)
Number of employed family members		0.000***	-0.080***	-0.035***
		(0.000)	(0.000)	(0.005)
Employment status of head: Employed		0.000***	-0.097***	0.001***
		(0.000)	(0.001)	(0.000)
Sector of head's employment: Industry		0.000***	-0.001***	0.004***
		(0.000)	(0.000)	(0.001)
Sector of head's employment: Services		0.000***	-0.007***	-0.000***
		(0.000)	(0.000)	(0.000)
_cons			0.099***	
			(0.002)	
Number of observations			9,640	
Adjusted R2				

note: .01 - ***; .05 - **; .1 - *; standard errors
in brackets

Table A4.3. Non-linear Oaxaca-Blinder decomposition of poverty change in Niger between 2014 and 2018 (presented in % of poverty change)

Overall	Total	Endowment	Return to endowment	Interaction
Change in poverty rates	100.0%			
Endowments	-3.0%			
Coefficients	109.2%			
Interaction	-6.2%			
Rural		0.5%	343.1%	3.0%
Agadez		-0.4%	-19.9%	-1.4%
Diffa		-0.1%	-2.9%	-0.1%
Dosso		0.0%	-2.8%	0.0%
Maradi		0.1%	-7.7%	0.2%
Tahoua		-0.4%	-58.6%	-1.3%
Tillaberi		-0.1%	-32.1%	-0.3%
Zinder		0.2%	-21.1%	1.0%
Number of kids age 0-5		-2.2%	-55.6%	3.9%
Number of kids age 6-14		8.4%	-52.7%	-8.9%
Number of adults age 15-64		1.4%	-12.8%	-0.9%
Number of adults age 65+		0.3%	17.8%	3.4%
Gender of head: Female		0.2%	-16.1%	4.0%
Age of head		-1.4%	-247.3%	-9.6%
Marital status of head: Never married		0.1%	-3.5%	-3.0%
Marital status of head: Widowed/Divorced/Separated		1.0%	-0.6%	3.9%
Head having health problem		-0.5%	2.4%	0.1%
Number of family members with no education		-0.2%	-101.9%	-10.7%
Number of family members with primary education		0.0%	18.5%	0.2%
Number of family members with secondary or above education		0.0%	0.0%	0.0%
Education of head: Primary		-0.2%	2.8%	-0.7%
Education of head: Secondary or above		0.5%	-11.4%	1.8%
Ownership of house		0.5%	37.7%	2.7%

Overall	Total	Endowment	Return to endowment	Interaction
Ownership of TV		-1.0%	-23.8%	-2.2%
Ownership of fan		0.0%	57.6%	0.5%
Ownership of radio		-5.8%	-39.1%	-15.2%
Ownership of motorbike		1.2%	11.1%	-2.4%
Ownership of phone		1.5%	13.2%	-1.0%
Walls with improved materials		-5.3%	18.2%	-25.4%
Roofs with improved materials		1.7%	-2.1%	0.6%
Floor with improved materials		0.4%	1.4%	-0.2%
Access to electricity		-0.1%	15.3%	0.5%
Access to drinking water		-0.9%	80.3%	-12.6%
Access to improved sanitation facility		-1.6%	-19.8%	-4.7%
Access to improved waste management		-0.5%	15.4%	-5.6%
Having family shock		-1.5%	4.4%	-5.6%
Having natural disaster shock		0.0%	-15.4%	2.0%
Having economic shock		2.1%	58.0%	20.3%
Number of employed family members		-0.5%	146.8%	64.8%
Employment status of head: Employed		-0.2%	179.3%	-1.0%
Sector of head's employment: Industry		-0.4%	2.4%	-6.6%
Sector of head's employment: Services		-0.1%	12.6%	0.3%
cons			-181.8%	

Table A4.4 Unconditional quantile regressions for change in consumption growth among households in the bottom 40 percent of the consumption distribution

	Total	Endowment	Return to endowment	Interaction
Log consumption in 2018	12.099***			
	(0.000)			
Log consumption in 2014	12.014***			
	(0.000)			
Change in Log consumption	0.085***			
	(0.000)			
Endowments	0.026***			
	(0.000)			
Coefficients	0.087***			
	(0.000)			
Interaction	-0.027***			
	(0.000)			
Rural		0.002***	0.246***	-0.002***
		(0.000)	(0.001)	(0.000)
Agadez		-0.001***	-0.008***	0.001***
		(0.000)	(0.000)	(0.000)
Diffa		-0.000***	-0.004***	0.000***
		(0.000)	(0.000)	(0.000)
Dosso		0.000*	0.010***	-0.000*
		(0.000)	(0.000)	(0.000)
Maradi		0.000***	-0.003***	-0.000***
		(0.000)	(0.000)	(0.000)
Tahoua		-0.002***	-0.040***	0.001***
		(0.000)	(0.000)	(0.000)
Tillaberi		-0.000***	-0.021***	0.000***
		(0.000)	(0.000)	(0.000)
Zinder		0.001***	-0.015***	-0.001***
		(0.000)	(0.000)	(0.000)
Number of kids age 0-5		-0.008***	-0.118***	-0.009***
		(0.000)	(0.001)	(0.000)
Number of kids age 6-14		0.033***	-0.163***	0.030***
		(0.000)	(0.001)	(0.000)
Number of adults age 15-64		-0.007***	-0.260***	0.021***
		(0.000)	(0.001)	(0.000)
Number of adults age 65+		-0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)
Gender of head: Female		-0.001***	-0.012***	-0.003***
		(0.000)	(0.000)	(0.000)

	Total	Endowment	Return to endowment	Interaction
Age of head		-0.008***	-0.282***	0.012***
		(0.000)	(0.001)	(0.000)
Marital status of head: Never married		0.002***	-0.005***	0.005***
		(0.000)	(0.000)	(0.000)
Marital status of head: Widowed/Divorced/Separated		-0.002***	0.001***	0.004***
		(0.000)	(0.000)	(0.000)
Head having health problem		-0.001***	0.017***	-0.001***
		(0.000)	(0.000)	(0.000)
Number of family members with no education		0.015***	0.291***	-0.034***
		(0.000)	(0.002)	(0.000)
Number of family members with primary education		0.000***	0.115***	-0.002***
		(0.000)	(0.001)	(0.000)
Number of family members with secondary or above education		(dropped)	0.029***	0.000***
			(0.000)	(0.000)
Education of head: Primary		0.001***	-0.003***	-0.001***
		(0.000)	(0.000)	(0.000)
Education of head: Secondary or above		0.001***	-0.004***	-0.001***
		(0.000)	(0.000)	(0.000)
Ownership of house		0.000	-0.002**	0.000**
		(0.000)	(0.001)	(0.000)
Walls with improved materials		-0.021***	0.014***	0.021***
		(0.000)	(0.000)	(0.000)
Roofs with improved materials		0.009***	-0.005***	-0.002***
		(0.000)	(0.000)	(0.000)
Floor with improved materials		0.002***	0.001***	0.000***
		(0.000)	(0.000)	(0.000)
Access to electricity		-0.000***	0.014***	-0.000***
		(0.000)	(0.000)	(0.000)
Access to drinking water		-0.004***	0.071***	0.012***
		(0.000)	(0.000)	(0.000)
Access to improved sanitation facility		-0.003***	-0.011***	0.003***
		(0.000)	(0.000)	(0.000)
Access to improved waste management		-0.002***	0.006***	0.002***
		(0.000)	(0.000)	(0.000)
Having family shock		-0.010***	0.007***	0.009***
		(0.000)	(0.000)	(0.000)
Having natural disaster shock		-0.001***	-0.004***	-0.001***
		(0.000)	(0.000)	(0.000)
Having economic shock		0.012***	0.052***	-0.020***
		(0.000)	(0.000)	(0.000)

	Total	Endowment	Return to endowment	Interaction
Number of employed family members		0.021***	0.168***	-0.082***
		(0.000)	(0.000)	(0.000)
Employment status of head: Employed		-0.000***	0.064***	0.000***
		(0.000)	(0.001)	(0.000)
Sector of head's employment: Industry		-0.000***	0.002***	0.007***
		(0.000)	(0.000)	(0.000)
Sector of head's employment: Services		-0.000***	0.015***	-0.000***
		(0.000)	(0.000)	(0.000)
__cons			-0.079***	
			(0.002)	
Number of observations			9,640	
Adjusted R2				
note: .01 - ***; .05 - **; .1 - *; standard errors in brackets				

Table A4.5 Unconditional quantile regressions for change in consumption growth among households in the bottom 40 percent of the consumption distribution (presented in share of change in consumption growth)

	Total	Endowment	Return to endowment	Interaction
Change in Log consumption	100.0%			
Endowments	30.1%			
Coefficients	102.1%			
Interaction	32.2%			
Rural		2.0%	216.1%	-2.1%
Agadez		-1.0%	-6.6%	0.5%
Diffa		-0.3%	-3.1%	0.1%
Dosso		0.0%	8.6%	0.0%
Maradi		0.1%	-2.8%	-0.1%
Tahoua		-1.5%	-35.1%	0.9%
Tillaberi		-0.2%	-18.0%	0.2%
Zinder		0.8%	-12.8%	-0.7%
Number of kids age 0-5		-7.0%	-104.0%	-8.1%
Number of kids age 6-14		29.2%	-143.1%	26.8%
Number of adults age 15-64		-5.7%	-227.9%	18.2%

	Total	Endowment	Return to endowment	Interaction
Number of adults age 65+	0.0%	-0.1%	0.0%	
Gender of head: Female	-0.8%	-10.4%	-2.8%	
Age of head	-6.7%	-248.1%	10.7%	
Marital status of head: Never married	1.7%	-4.4%	4.1%	
Marital status of head: Widowed/Divorced/Separated	-1.8%	0.5%	3.9%	
Head having health problem	-1.1%	15.3%	-0.7%	
Number of family members with no education	12.8%	255.7%	-29.7%	
Number of family members with primary education	0.1%	101.2%	-1.3%	
Number of family members with secondary or above education	0.0%	25.4%	0.3%	
Education of head: Primary	0.4%	-2.9%	-0.8%	
Education of head: Secondary or above	1.1%	-3.8%	-0.7%	
Ownership of house	0.0%	-1.4%	0.1%	
Walls with improved materials	-18.9%	11.9%	18.4%	
Roofs with improved materials	7.6%	-4.2%	-1.4%	
Floor with improved materials	1.7%	1.2%	0.2%	
Access to electricity	-0.3%	12.3%	-0.4%	
Access to drinking water	-3.6%	62.4%	10.8%	
Access to improved sanitation facility	-2.4%	-9.3%	2.4%	
Access to improved waste management	-1.6%	5.4%	2.2%	
Having family shock	-9.0%	5.9%	8.3%	
Having natural disaster shock	-1.1%	-3.3%	-0.5%	
Having economic shock	10.4%	45.5%	-17.6%	
Number of employed family members	18.6%	147.5%	-71.8%	
Employment status of head: Employed	-0.3%	56.1%	0.3%	
Sector of head's employment: Industry	-0.3%	2.1%	6.5%	
Sector of head's employment: Services	-0.3%	13.4%	-0.4%	
_cons		-69.0%		

ANNEX 5. IMPACTS OF SHOCKS ON HOUSEHOLDS' WELFARE

1. BACKGROUND

Assessing vulnerability in different households is important. It provides policymakers with guidance on how to efficiently allocate resources to prevent households from falling into poverty in the future. Unlike measuring poverty, which is ex-post using household income or consumption, measuring vulnerability is conceptually and empirically much more complex. It quantifies the threat of poverty in the future. Therefore, vulnerability analysis has two components: the likelihood of shocks occurring, and the impact of shocks on welfare (Calvo & Dercon 2013; Hohberg et al. 2018; Hoddinott & Quisumbing 2003).

Both idiosyncratic and covariate shocks have serious impacts on poor households' income and overall well-being. In Niger, the most commonly reported shocks over the period 2018-2019 are drought and illness/death of family members, followed by illness of family members and high food prices (Figure 1). Rural and urban households experience different types of shocks. In rural areas, 35.6% of families report drought as the most severe shock. For urban families, on the other hand, illness and death of family members are the most frequently reported shocks. 38.4% of the urban households reported these two shocks as the most severe shocks they experienced in the past three years. Drought is less of a problem for urban people since nearly 95% of the household income is non-agriculture income. It's worth noting that although fewer households experienced conflict/violence and reported it as a shock, the impact is severe as it affects the household welfare both directly and indirectly (Justino, 2011). Its direct impact includes illness of family member, reduction in nutrition level and destruction of assets. It also indirectly breaks the social relation and cohesion, affects both the exchange and employment market, changes the structure of political institutions, and slows economic growth. Hess (2003) found that on average individuals who live in a country that has experienced some conflict would permanently give up to approximately 8 percent of their current level of consumption to live in a purely peaceful world. Jennings & Sanchez-Pages (2017) conclude that when the threat is severe, social capital and welfare are likely to fall and this effect of an external threat on social capital is stronger in poor economies.

A large body of literature have studied the impact of weather shocks on people's wellbeing ((Baez, de la Fuente, & Santos, 2010) (Dell, Jones, & Olken, 2014)). The impact can be short-run and long-run. Kazianga & Udry (2006) find that droughts and erratic rainfall halve crop income and reduce consumption significantly among affected households. The negative impact also carries over the longer term. Children who become stunted due to droughts or floods often do not fully recover later in life, resulting in lower school attainment and earnings in adulthood (Alderman, Hoddinott, & Kinsey, 2006). Moreover, the impact often hit the deprived population most (Del Ninno & Lundberg, 2005). Health shocks are also found to be negatively correlated with welfare. In Indonesia, Gertler and Gruber (2002) found that households faced with health shocks are unable to fully ensure consumption. Lindelow and Wagstaff (2005) found that negative health shocks are associated with a significant reduction in income in China. Impact heterogeneity is also found by Wagstaff (2007) and Atake (2018). Wagstaff (2007) discovers

that urban households were more vulnerable in terms of reduced earned income; while Atake (2018) finds that the poorest households, such as those in Sub-Saharan French-Speaking Africa countries (SSAF) may be the most vulnerable to health shocks.

The rest of this paper is organized as follows: section 2 describes the data and limitations; section 3 presents the methodology; results and robustness checks are discussed in section 4. Section 5 concludes.

2. DATA

The Harmonized Household Living Standards Survey 2018/19 for Niger is used for this study, which is nationally representative. It contains two rounds, with the first round conducted from September to December in 2018 and the second round carried out between April and July in 2019. It provides households self-reported shock data and various welfare indicators.

Figure 2. Average region-level welfare measures
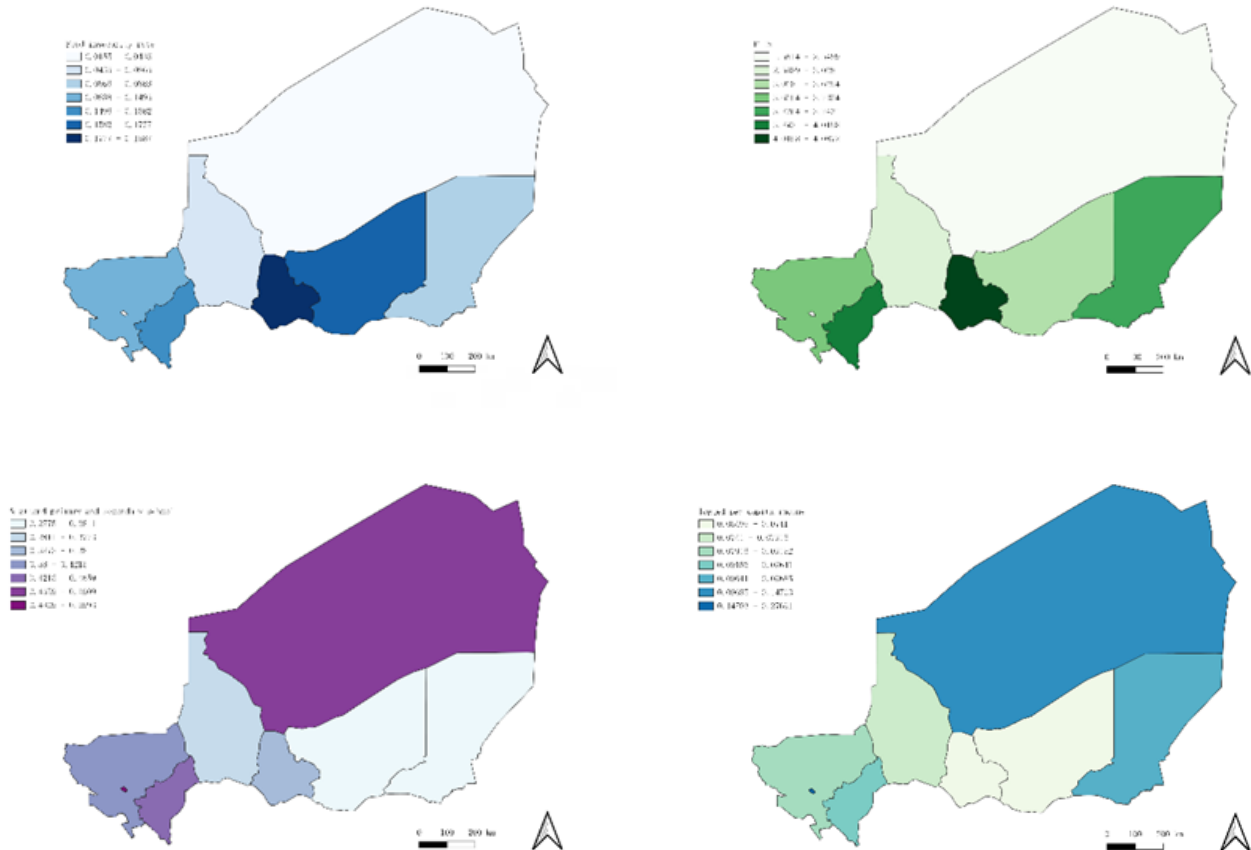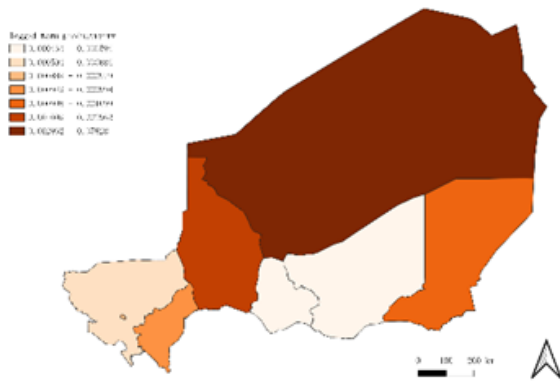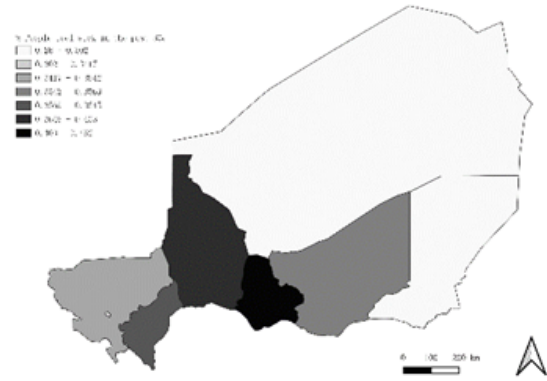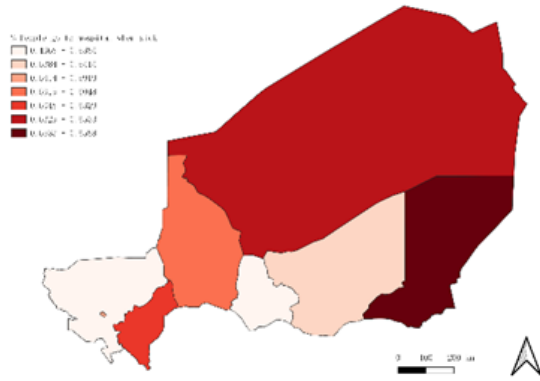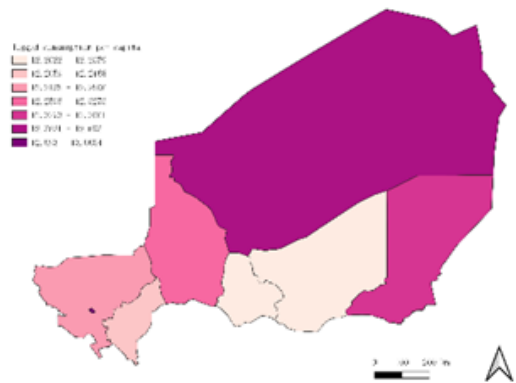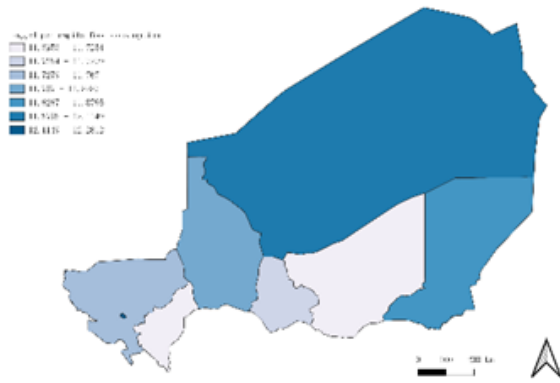
The welfare indicators used in this study include both monetary measure and non-monetary measure. More specifically, the following dependent variables are used: percentage of people feeling sick in the past 30 days, percentage of them going to the hospital, primary and secondary school attendance rate, income per capita, consumption per capita, food consumption per capita, farm productivity, FIES, and food insecurity rate. Figure 2 shows these measures averaged at the regional level.

Monetary indicators - per capita household income and consumptions - are generally regarded as the best proxies for household welfare. In Niger, urban households make 27% more annual income than rural households, allowing them to have more savings to cope with adverse events. The income structure also differs in urban and rural areas. Figure 2.1 shows that urban households depend on salary and enterprise income. In the capital city Niamey, almost all of the household income is gained from non-agriculture activities. On the other hand, rural households rely mainly on agriculture and agriculture income. In the south, where the main food crops are planted, agriculture income is the most important source of income.

The survey data indicates that if a person feels sick, only 56.5% of the time would he or she go to the hospital. Of those who didn't seek medical advice in the past 30 days, 61% of the rural population and 73% of the urban population self-medicate themselves.

The school enrollment rate is used as an education indicator. Education in Niger is structured in much the same way as in the rest of the world: primary, secondary, and higher education. As of 2018, despite the efforts to improve education, the country had the third lowest adult literacy rate in the world (31%), comparing to the world average of 86.3%. On average, only 45% of the kids between 6 and 18 years old in the household are enrolled in primary or secondary schools. The situation is much better in urban households, being 77% of children aged 6 to 18 are enrolled in primary and secondary schools. In rural households, this rate is about 39%. The biggest problem the education sector encounter is lack of books and equipment. Of those who reported a certain problem in education, the majority is rural population, meaning that rural people face problems more frequently and are thus more likely to drop out of school. Table 1 presents summary statistics of all the variables used in our analysis.

Table A5.1. Summary Statistics

	Rural	Urban	All
Dependent variables			
Feel sick in the past 30 days	0.406	0.383	0.402
Go to hospital if sick in the past 30 days	0.550	0.599	0.558
Primary and secondary attendance rate	0.306	0.672	0.366
Logged income per capita	0.079	0.243	0.107
Logged consumption per capita	12.29	12.99	12.41
Logged food consumption per capita	11.79	12.33	11.89
Logged farm productivity	0.001	0.014	0.002
FIES	3.729	2.110	3.452
Food insecurity rate	0.117	0.020	0.100
Shocks			
Self-reported death shock	0.078	0.081	0.078
Self-reported drought shock	0.333	0.036	0.283
Self-reported conflict shock	0.013	0.020	0.014
Drought shock (CHIRPS)	0.071	0.123	0.080
Severe drought shock (CHIRPS)	0.018	0.071	0.027
Logged number of fatalities within 15km	0.330	0.558	0.369
Logged number of fatalities within 20km	0.340	0.572	0.380
Logged number of fatalities within 25km	0.351	0.631	0.399
Household characteristics			
Rural			0.832
Household size	5.97	5.92	5.96
Dependency ratio	157.18	107.14	148.58
Enrollment rate	0.31	0.67	0.37
Age 0-14	3.35	2.72	3.24
Age 15-64	2.46	3.04	2.56
Age 65+	0.15	0.16	0.16
Agriculture household	0.72	0.15	0.62
% ever experienced a shock	0.71	0.50	0.68

	Rural	Urban	All
Head of household characteristics			
Average age	43.32	46.75	43.91
% women	0.18	0.16	0.17
% primary education	0.09	0.19	0.11
% secondary education	0.05	0.17	0.07
% tertiary education	0.00	0.09	0.02
Literary rate (French)	0.12	0.43	0.17
Literacy rate	0.31	0.54	0.35
Housing characteristics			
% have access to electricity	0.07	0.58	0.16
% have access to water	0.02	0.50	0.10
% have toilet	0.01	0.26	0.05

As shown in part 2 of Table 1, drought is calculated using CHIRPS data, which provides a measure of monthly rainfall for each 5.7 by 5.7 km pixel in the country. Households were matched to the average of its 4 nearest rainfall observations using the GPS coordinates in the EHCVM 2018/19. If during the planting season (June to September 2018), any month's rainfall falls below 1 standard deviation below its 10-year monthly average, it's considered a drought shock to that household. I also define severe drought as two consecutive months below their respective 10-year average rainfall during the planting season. Self-reported drought shock from EHCVM 2018/19 is also used, which indicates whether the household has experienced any drought shock in the past 3 years.

Data on conflict events come from the Armed Conflict Location & Event Data Project (ACLED). It collects the dates, actors, locations, fatalities, and modalities of all reported political violence and protest events across Africa and many other regions. Conflict events reported in ACLED data include battles, explosions/remote violence, protests, riots, strategic developments, and violence against civilians, as well as their associated number of fatalities. I match household to the conflict events within 15km, 20km, 25 km radius and calculated the logged number of

fatalities as the conflict shock measurement. In addition, a dummy from EHCVM 2018/19 which is self-reported by household if it experienced any armed conflict/violence/insecurity in the past 3 years is also used to quantify conflict shock.

Households self-reported shock on the death of a household member in the past 3 years from EHCVM 2018/19 is used to define idiosyncratic health shock. As introduced earlier, high food piece is also an important shock to households. Many literatures have discovered negative impact of high price level on consumptions ((Alem & Söderbom, 2012) (Cornelsen, et al., 2015) (Andreyeva, Long, & Brownell, 2010)). A perfect dataset would include several years' worth of observations for each household, and even better, information on what could happen and how probable this is/was in differing states of the world. In the absence of such scenarios, and of panel data, price shock is not explored in this study.

3. METHODOLOGY

In this paper, we follow the model in (Hill, Nikoloski, & Tao, 2019) to examine the impact of shocks on household welfare and other outcomes.

To capture the impact of shocks on households' welfare and outcomes in education, health, and food security, and to further explore the possible heterogeneity of impact, two regression models are adopted in this paper. The two models estimated are given by equation (1) and (2) below:

$$lny_i = \beta_0 + \beta_s S_i + \beta_x X_i + \beta_h H_i + \beta_a A_i + R_i + \varepsilon_i \qquad (1)$$

$$lny_i = \beta_0 + \beta_s S_i * Rural_i + \beta_u Rural_i + \beta_x X_i + \beta_h H_i + \beta_a A_i + R_i + \varepsilon_i \qquad (2)$$

y_i is a welfare indicator of household i including whether household members feel sick; if sick, whether they go to the hospital; primary and secondary school enrollment rate; food insecurity experience scale; food consumption per capita; total consumption per capita, and income per capita. S_i is a vector comprising both idiosyncratic shocks of the death of a family member and covariate shocks drought and conflict.

A rich set of household characteristics are represented by X_i, including household size, female-headed household, household age, household head education level, and the number of people in different age groups. H_i is a set of variables capturing access to basic infrastructures like water, electricity, and improved sanitation. A_i includes the land size, pesticide and fertilizer usage, and the value of owned livestock. R_i takes care of the region fixed effect. Equation (2) also includes the interactions of rural dummy and shock variables to identify which area bears more impact.

The main identification challenge in assessing the impact of shocks is endogeneity. Poor households with limited coping mechanisms are more likely to report shocks than the non-poor households, who tend to have good mitigation and coping strategies in place. To address the endogeneity issue, I use weather shock indicators derived by exogenously measured rainfall and conflict shock indicators derived from ACLED dataset. These indicators are matched to household survey by GPS coordinates.

Even when measured exogenously, the probability of occurrence of a shock is not exogenous to consumption per capita across households. Arid areas are more likely to be poor and hit by frequent droughts due to their geography. This study relies on the following observation to address this: although variation in the probability distribution of S_i may not be considered exogenous to welfare across households, the timing of a shock conditional on its distribution is exogenous (Thomas et al., 2010; Anttila-Hughes and Hsiang, 2013). Therefore, the historical distribution of rainfall data is considered in the construction of drought indicators in this study.

Moreover, idiosyncratic health shock is difficult to measure exogenously. This possible endogeneity is taken care of by including a rich set of household characteristics that could corelated with differences in self-reporting of the shock.

4. RESULTS AND ROBUSTNESS CHECKS

Regression analysis is used to quantify the impact of shocks on various welfare measures. As a first step, no geographic difference is considered. Results are presented in Table 2.

If the household ever experienced the death of family members in the past 3 years, the probability of household members feeling sick in the past 30 days is increased by 4.4 percentage points. Drought has the expected negative impact on health but not statistically significant. (Mara, Lane, Scott, & Trouba, 2010) and (Bartram & Cairncross, 2010) find that improved sanitation has significant impacts on health. In this study, although negative correlation is found between improved sanitation and health, it's not significant. Femake-headed households are 4 percentage points more likely to be sick.

If feeling sick in the past 30 days, people facing conflict shock in the past 3 years are more likely to go to the hospital (9 percentage points increase in likelihood). Household having access to electricity increases the chance of people seeking medical help by 6 percentage points. The survey data shows households with access to electricity or toilet have higher annual income (Figure 3). Households with access to basic infrastructure generally have higher education level, which explains why these households are more likely to seek health services (Woldemicael, 2010).

Table A5.2. Regression Results – Basic Model

VARIABLES	(1) sick_30d	(2) med_30d	(3) attend_pct	(4) lnincpc	(5) lnexp	(6) lnfoodexp	(7) ltfp	(8) fies	(9) food_security
hhsize	0.0455***	-0.00310	-0.0458**	-0.0152***	0.00221	0.00344	-0.000666	0.214	-0.0106
	(0.0136)	(0.0201)	(0.0196)	(0.00490)	(0.0225)	(0.0237)	(0.000728)	(0.139)	(0.0181)
hhh_fem	0.0407***	-0.000494	0.0554***	-0.0226***	-0.0257	-0.0468	-0.00120	0.351***	0.0189
	(0.0148)	(0.0222)	(0.0212)	(0.00378)	(0.0262)	(0.0313)	(0.00112)	(0.129)	(0.0201)
hhh_age	-0.000879**	-0.000754	0.00355***	0.000317**	-0.00175**	-0.000985	-1.88e-05	-0.00461	0.00166***
	(0.000426)	(0.000655)	(0.000623)	(0.000150)	(0.000769)	(0.000862)	(1.59e-05)	(0.00428)	(0.000611)
hhh_primary	0.00356	0.0378	0.0393*	0.0139**	0.0977***	0.0862***	-0.00243	-0.202	-0.0118
	(0.0174)	(0.0246)	(0.0222)	(0.00676)	(0.0273)	(0.0300)	(0.00213)	(0.146)	(0.0212)
hhh_secondary	0.0198	0.0907***	0.175***	0.0361***	0.175***	0.125***	-0.00258	-0.352**	-0.0517*
	(0.0198)	(0.0270)	(0.0305)	(0.00868)	(0.0365)	(0.0394)	(0.00222)	(0.167)	(0.0272)
hhh_tertiary	-0.0340	0.0148	0.202***	0.254***	0.585***	0.394***	-0.00957	-1.021***	-0.00468
	(0.0265)	(0.0548)	(0.0397)	(0.0353)	(0.0469)	(0.0487)	(0.00951)	(0.265)	(0.0198)
num_kids0005	-0.0511***	0.0128	0.0429**	0.00789	-0.101***	-0.0990***	0.000530	-0.118	0.0641***
	(0.0139)	(0.0206)	(0.0201)	(0.00515)	(0.0233)	(0.0249)	(0.000530)	(0.146)	(0.0193)
num_kids0614	-0.0551***	0.00649	0.0921***	0.00825*	-0.0733***	-0.0681***	0.000514	-0.169	0.0376**
	(0.0137)	(0.0204)	(0.0195)	(0.00475)	(0.0223)	(0.0238)	(0.000547)	(0.138)	(0.0181)
num_1564	-0.0584***	0.00148	0.0338*	0.0107**	-0.0175	-0.0256	0.000853	-0.219	0.0126
	(0.0133)	(0.0200)	(0.0200)	(0.00492)	(0.0228)	(0.0243)	(0.000958)	(0.134)	(0.0187)
access_elec	0.0114	0.0568**	0.219***	0.0311***	0.365***	0.309***	0.00393	-1.005***	-0.0978***
	(0.0191)	(0.0262)	(0.0255)	(0.0296)	(0.0328)	(0.0336)	(0.00343)	(0.140)	(0.0135)
access_water	-0.0134	0.0279	0.103***	0.298***	0.220***	0.218***	0.0196	-0.737***	-0.0527***
	(0.0205)	(0.0301)	(0.0293)	(0.0389)	(0.0395)	(0.0408)	(0.0191)	(0.194)	(0.0163)

VARIABLES	(1) sick_30d	(2) med_30d	(3) attend_pct	(4) lnincpc	(5) lnexp	(6) lnfoodexp	(7) ltfp	(8) fies	(9) food_security
type_ sanitation	-0.0233 (0.0196)	0.0207 (0.0324)	0.0462 (0.0308)	0.277*** (0.0386)	0.190*** (0.0413)	0.189*** (0.0431)	-0.00847 (0.00844)	-1.059*** (0.173)	0.00881 (0.0217)
landsize	0.00382** (0.00191)	0.00169 (0.00255)		0.00735** (0.00294)	0.00801** (0.00337)	0.00615* (0.00338)	-0.000299 (0.000192)	-0.0420*** (0.0146)	-0.00562*** (0.00206)
use_pesti	0.00112 (0.0165)	0.00721 (0.0263)		0.0686** (0.0275)	0.0765** (0.0310)	0.103*** (0.0334)	0.000263 (0.000637)	0.260 (0.168)	-0.0584** (0.0236)
use_fer	0.00510 (0.0156)	-0.0285 (0.0242)		0.117*** (0.0264)	0.138*** (0.0294)	0.152*** (0.0310)	-0.000487 (0.000976)	-0.435*** (0.152)	-0.0273 (0.0230)
livestock	-0.00161* (0.000901)	-0.00260* (0.00141)		0.00916*** (0.00156)	0.0112*** (0.00177)	0.0137*** (0.00184)	7.59e-05 (7.48e-05)	-0.0687*** (0.00830)	-0.00633*** (0.00129)
death_hh	0.0534*** (0.0185)	0.00425 (0.0255)	-0.0178 (0.0252)	-0.00279 (0.0249)	0.00304 (0.0289)	-0.00805 (0.0305)	1.63e-05 (0.000603)	0.487*** (0.177)	-0.0166 (0.0227)
ddrought	-0.00973 (0.0112)	0.0231 (0.0172)	-0.00596 (0.0159)	-0.108*** (0.0173)	-0.113*** (0.0206)	-0.107*** (0.0217)	-0.000803 (0.000775)	0.743*** (0.103)	0.0613*** (0.0158)
conflict	-0.0635** (0.0307)	0.0943* (0.0539)	0.00753 (0.0543)	-0.0155 (0.0460)	-0.0918 (0.0640)	-0.108* (0.0633)	0.00145 (0.00107)	1.237*** (0.299)	0.0363 (0.0426)
Constant	0.410*** (0.0239)	0.642*** (0.0401)	0.0903*** (0.0329)	12.74*** (0.0433)	12.16*** (0.0480)	12.17*** (0.0510)	0.0589*** (0.0131)	3.735*** (0.240)	-0.0820** (0.0322)
Observations	6,022	4,915	4,584	6,022	6,022	6,022	3,612	6,022	6,022
R-squared	0.063	0.031	0.196	0.486	0.323	0.296	0.051	0.158	0.141

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A5.3. Regression Results – Full Model

VARIABLES	(10) sick_30d	(11) med_30d	(12) attend_pct	(13) lnincpc	(14) lnexp	(15) lnfoodexp	(16) fies	(17) food_security
death_hh_rural	0.0654***	0.0176	-0.0161	-0.00705	0.0128	0.0297	0.568***	-0.0318
	(0.0214)	(0.0289)	(0.0283)	(0.00441)	(0.0270)	(0.0314)	(0.205)	(0.0261)
death_hh_ urban	-0.00408	-0.0604	-0.00762	0.00534	-0.0790	-0.125*	0.109	0.0551
	(0.0290)	(0.0473)	(0.0419)	(0.0181)	(0.0614)	(0.0701)	(0.273)	(0.0399)
drought_rural	-0.00738	0.0245	0.0131	-0.00813**	-0.0900***	-0.0961***	0.715***	0.0548***
	(0.0114)	(0.0176)	(0.0162)	(0.00364)	(0.0176)	(0.0210)	(0.106)	(0.0163)
drought_urban	-0.0739*	0.00291	0.138***	-0.0163	-0.250***	-0.217**	0.650	0.0763
	(0.0420)	(0.0695)	(0.0530)	(0.0256)	(0.0661)	(0.0851)	(0.514)	(0.0517)
conflict_rural	-0.0769**	0.0591	0.0224	0.00140	-0.0555	-0.166**	1.395***	0.0667
	(0.0367)	(0.0668)	(0.0650)	(0.00950)	(0.0510)	(0.0745)	(0.348)	(0.0531)
conflict_urban	-0.0305	0.177***	-0.120*	-0.0121	0.0253	0.0398	0.950*	-0.0151
	(0.0413)	(0.0515)	(0.0702)	(0.0199)	(0.0719)	(0.0755)	(0.515)	(0.0317)
rururb	-0.0168	-0.0213	-0.247***	-0.0358***	-0.213***	-0.219***	0.385**	0.0960***
	(0.0197)	(0.0284)	(0.0257)	(0.00819)	(0.0301)	(0.0327)	(0.166)	(0.0167)
hhsize	0.0455***	-0.00329	-0.0441**	-0.0152***	0.00222	0.00299	0.215	-0.0103
	(0.0136)	(0.0202)	(0.0194)	(0.00490)	(0.0221)	(0.0235)	(0.138)	(0.0181)
hhh_fem	0.0419***	0.00141	0.0516**	-0.0220***	-0.0205	-0.0403	0.351***	0.0156
	(0.0149)	(0.0223)	(0.0210)	(0.00375)	(0.0259)	(0.0309)	(0.128)	(0.0199)
hhh_age	-0.000882**	-0.000770	0.00326***	0.000271*	-0.00199***	-0.00122	-0.00404	0.00176***
	(0.000427)	(0.000656)	(0.000618)	(0.000149)	(0.000762)	(0.000857)	(0.00428)	(0.000611)
hhh_primary	0.00436	0.0379	0.0245	0.0119*	0.0893***	0.0776***	-0.174	-0.00784
	(0.0174)	(0.0245)	(0.0220)	(0.00654)	(0.0269)	(0.0296)	(0.145)	(0.0210)
hhh_secondary	0.0198	0.0908***	0.180***	0.0364***	0.177***	0.127***	-0.357**	-0.0523*
	(0.0198)	(0.0271)	(0.0304)	(0.00869)	(0.0357)	(0.0387)	(0.167)	(0.0269)
hhh_tertiary	-0.0366	0.0135	0.220***	0.257***	0.593***	0.402***	-1.072***	-0.00778
	(0.0268)	(0.0551)	(0.0383)	(0.0352)	(0.0482)	(0.0515)	(0.262)	(0.0204)

VARIABLES	(10) sick_30d	(11) med_30d	(12) attend_pct	(13) lnincpc	(14) lnexp	(15) lnfoodexp	(16) fies	(17) food_security
num_kids0005	-0.0510***	0.0132	0.0446**	0.00822	-0.0988***	-0.0965***	-0.122	0.0629***
	(0.0139)	(0.0206)	(0.0199)	(0.00514)	(0.0230)	(0.0248)	(0.145)	(0.0192)
num_kids0614	-0.0552***	0.00660	0.0906***	0.00820*	-0.0735***	-0.0680***	-0.170	0.0374**
	(0.0137)	(0.0204)	(0.0192)	(0.00473)	(0.0219)	(0.0237)	(0.137)	(0.0181)
num_1564	-0.0584***	0.00153	0.0283	0.00983**	-0.0214	-0.0290	-0.208	0.0139
	(0.0132)	(0.0200)	(0.0197)	(0.00492)	(0.0224)	(0.0241)	(0.134)	(0.0187)
access_elec	0.0108	0.0548**	0.164***	0.0243***	0.329***	0.272***	-0.922***	-0.0816***
	(0.0198)	(0.0271)	(0.0274)	(0.00811)	(0.0302)	(0.0330)	(0.145)	(0.0134)
access_water	-0.0200	0.0187	0.0228	0.0547***	0.231***	0.149***	-0.619***	-0.0214
	(0.0208)	(0.0304)	(0.0288)	(0.0107)	(0.0374)	(0.0383)	(0.193)	(0.0154)
type_sanitation	-0.0233	0.0191	-0.0111	0.0748***	0.242***	0.155***	-0.969***	0.0238
	(0.0199)	(0.0327)	(0.0300)	(0.0154)	(0.0395)	(0.0425)	(0.175)	(0.0218)
landsize	0.00387**	0.00191		0.00133**	0.00987***	0.0106***	-0.0481***	-0.00678***
	(0.00192)	(0.00256)		(0.000536)	(0.00294)	(0.00339)	(0.0147)	(0.00209)
use_pesti	0.00150	0.00760		0.00973*	0.0722***	0.0797***	0.252	-0.0594**
	(0.0165)	(0.0263)		(0.00521)	(0.0273)	(0.0308)	(0.168)	(0.0235)
use_fer	0.00543	-0.0286		0.0136**	0.120***	0.140***	-0.440***	-0.0283
	(0.0156)	(0.0242)		(0.00529)	(0.0263)	(0.0294)	(0.152)	(0.0229)
livestock	-0.00143	-0.00235		0.000767**	0.0111***	0.0132***	-0.0720***	-0.00721***
	(0.000911)	(0.00145)		(0.000333)	(0.00154)	(0.00176)	(0.00839)	(0.00132)
Constant	0.421***	0.659***	0.289***	0.141***	12.89***	12.32***	3.461***	-0.151***
	(0.0275)	(0.0442)	(0.0393)	(0.0125)	(0.0477)	(0.0536)	(0.265)	(0.0351)
Observations	6,022	4,915	4,584	6,022	6,022	6,022	6,022	6,022
R-squared	0.064	0.032	0.224	0.301	0.494	0.332	0.160	0.146

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 3. Household income and education level by access to infrastructure
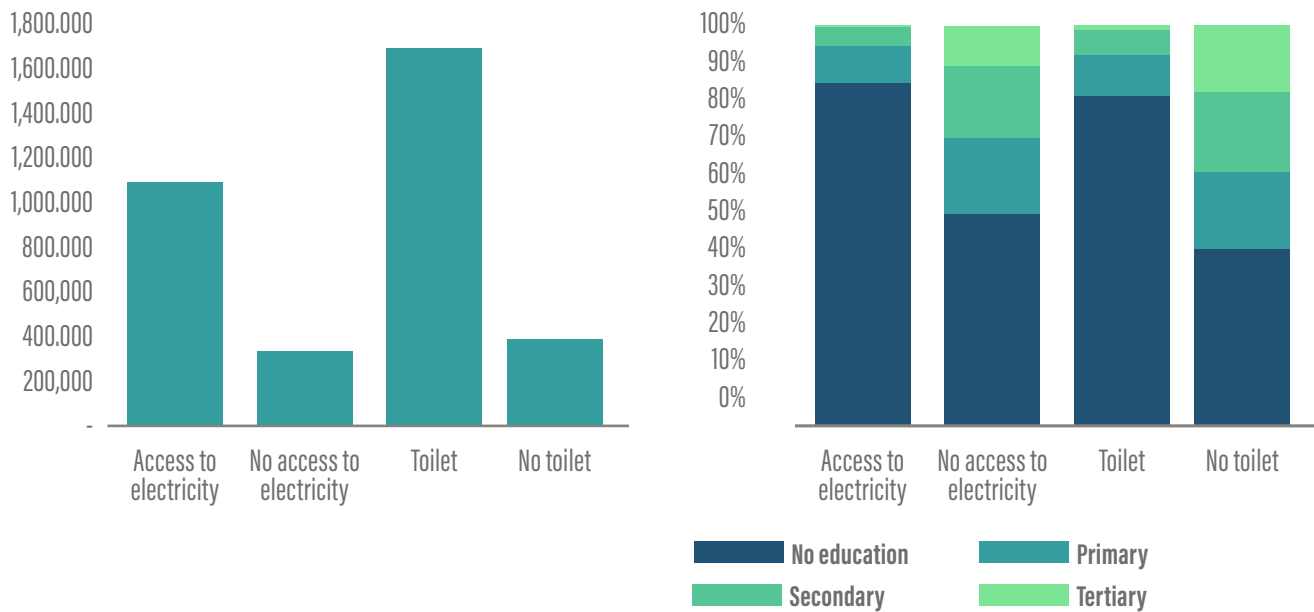
Source: Author's calculation

The primary and secondary school enrollment rate is defined for the 2017/2018 school year. None of the shocks have significant relationship with enrolment rate. Having access to electricity significantly increases enrolment by 21.9%. Water is associated with 10 percent increase in enrollment. In fact, across all regressions, having electricity and water makes people better off.

Drought decreases income per capita by 1 percentage point. No statistically significant relationships are found between income and other shocks; perhaps because income includes non-agriculture income like livestock, salary, and enterprise. Take livestock, for instance, the rainfall over multiple seasons is important. Post-secondary education increases annual income per capita by 25% compared with no education. Secondary education increases annual income per capita by 4% compared with no education. Therefore, better education helps income growth (Gyimah-Brempong, Paddison, & Mitiku, 2006) (Jamison, Jamison, & Hanushek, 2007). Moreover, fertilizer use is positively correlated with income potentially because about 57% of income is agriculture income and

fertilizer and pesticide increase agriculture productivity. Experiencing drought in the past three years decreases total consumption and food consumption by 10% and 11% respectively. Access to infrastructures continues to show a strong positive impact. Female-headed household is a negative factor for annual income and total consumption, though not significantly.

All three shocks are shown to have a significant negative impact on food security. If a household experiences death of family member in the past 3 years, its FIES will increase by 0.5 units, meaning more severe food insecurity. If this household also reports conflict and drought shocks, its FIES would further increase 2. Drought also increases food insecurity rate by 6 percentage points. Female- and old-headed households experience more severe food insecurity. On the other hand, higher education help ease the problem (Ojogho, 2010). Furthermore, owning livestock significantly decreases the level of food insecurity by providing households with additional means to cope with shocks and mitigate impacts.

Table 3 shows the results of the full model which explores different impacts in rural and urban areas. The impact of family member death on the probability of people feeling sick in the past 30 days is mainly driven by the impact on rural households. (Watts, 1987) already shows the linkage between drought and higher food insecurity. Drought shock would increase FIES further by 0.7 in the rural area. Drought has bigger impact on rural household's per capita food consumption, being 3% more. Conflict generally decreases all dimensions of people's welfare (Ibáñez & Vélez, 2008). The probability of people going to the hospital after feeling sick is lowered by 8 percentage points in the rural area. FIES is further reduced by 1.4 in rural area and 1 in urban area by conflict.

Alternative drought indicators are used and the results are presented in Table 4 and 5. In general, the negative impacts of drought on consumptions is primarily working through its impact on rural households. Severe drought in both rural and urban areas affect health negatively. It decreases the likelihood of going to hospital when sick in rural and urban areas by 13% and 11%, respectively. The negative impact of severe drought on total consumption is mainly from its urban impact.

Tables 6-8 show results using alternative conflict indicators derived from ACLED data. If conflict is defined as the number of fatalities within 15km and 20 km of households, it will decrease school enrollment rate by 2.1 percentage points and 1.9 percentage points in rural area. If conflict is defined as the number of fatalities within 25km of households, stronger impact is found on school enrollment rate. Health shock and drought are only significantly correlated with higher FIES and lower consumptions.

5. CONCLUSION

This paper contributes to the current literature by focusing on household vulnerability to both covariant and idiosyncratic shocks and studying the impact of shocks on people's wellbeing. The results show that the most commonly reported shocks in the past three years are drought for rural households and illness/death of family members for urban households. The commonly reported drought shock may be a result of a bad rainfall year during 2015-2017. Although conflict shocks are less frequently reported, its impact on people's wellbeing has grown. The conflict shocks are characterized by battle, explosions, and violence against civilians in Diffa and Tillaberi, and peaceful protests in Zinder and Niamey. Moreover, low-income people are the most vulnerable to health shocks. The nature and prevalence also vary between regions and household's characteristics. Rural households suffer more from weather and crop disease-related shocks. Households are also more vulnerable with the increase of household size.

The findings of this paper also highlight the negative impact of shocks on education, health, food insecurity, and income. Drought is found to have a significant negative impact on consumption. Health shock deteriorates people's health status and makes food insecurity more severe. Finally, these impacts are larger in rural areas. For more than 15 years, the World Bank has supported the Government of Niger's efforts to the development of several sectors. As of August 2019, $0.45 billion and $90 million have been invested in water and sanitation and education. The efforts put in education have helped construct new classrooms, improve the quality of teaching, and increase pupil retention rates. In June 2016,

financing totaling $35 million for the Urban Water and Sanitation Project (PEAMU) helped more than 893,500 people gain access to potable water, 52% of whom were women. Moreover, 67,560 pupils of the 86,940 targeted by the project had access to an improved sanitation system in their schools, and 708 latrines were constructed for teachers.[1] Based on this paper's finding that access to these basic infrastructure increases welfare outcomes. This support should be continued. Additionally, higher education level of household head help eases the drought impact on income, increasing investment in education is thus another important part of a plan to make Niger more resilient in the face of an increasingly uncertain world.

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1   The World Bank. https://www.worldbank.org/en/country/niger/overview#3

Table A5.4. Regression Results – full model; alternative "drought" based on CHIRPS

VARIABLES	(1) sick_30d	(2) med_30d	(3) attend_pct	(4) lnincpc	(5) lnexp	(6) lnfoodexp	(7) fies	(8) food_security
death_hh_rural	0.0659***	0.0149	-0.0164	-0.00666	0.0177	0.0344	0.542***	-0.0337
	(0.0214)	(0.0292)	(0.0284)	(0.00441)	(0.0269)	(0.0313)	(0.206)	(0.0261)
death_hh_urban	-0.000967	-0.0644	-0.0134	0.00690	-0.0623	-0.110	0.0606	0.0496
	(0.0290)	(0.0474)	(0.0420)	(0.0178)	(0.0614)	(0.0702)	(0.270)	(0.0400)
urban_drought	-0.0294	-0.0615	0.0108	-0.0242*	-0.164***	-0.118**	0.262	0.0421
	(0.0313)	(0.0432)	(0.0461)	(0.0139)	(0.0524)	(0.0532)	(0.280)	(0.0306)
rural_drought	-0.0301	-0.138***	0.000423	0.00115	0.0518	0.0818**	-0.299	-0.0215
	(0.0209)	(0.0393)	(0.0332)	(0.00595)	(0.0316)	(0.0364)	(0.221)	(0.0314)
conflict_rural	-0.0805**	0.0448	0.0216	0.00172	-0.0432	-0.148*	1.269***	0.0577
	(0.0372)	(0.0649)	(0.0654)	(0.00954)	(0.0504)	(0.0757)	(0.352)	(0.0530)
conflict_urban	-0.0315	0.156***	-0.123*	-0.00910	0.0563	0.0725	0.858	-0.0248
	(0.0419)	(0.0513)	(0.0710)	(0.0204)	(0.0755)	(0.0786)	(0.524)	(0.0330)

Table A5.5. Regression Results – full model; alternative "sdrought" based on CHIRPS

VARIABLES	(9) sick_30d	(10) med_30d	(11) attend_pct	(12) lnincpc	(13) lnexp	(14) lnfoodexp	(15) fies	(16) food_security
death_hh_rural	0.0663***	0.0162	-0.0165	-0.00663	0.0174	0.0342	0.543***	-0.0335
	(0.0215)	(0.0292)	(0.0284)	(0.00442)	(0.0269)	(0.0313)	(0.206)	(0.0261)
death_hh_urban	-0.000628	-0.0619	-0.0145	0.00653	-0.0662	-0.112	0.0674	0.0510
	(0.0291)	(0.0472)	(0.0420)	(0.0178)	(0.0607)	(0.0696)	(0.271)	(0.0398)
urban_sdrought	-0.110***	-0.111*	0.0228	-0.0394**	-0.167***	-0.205***	0.354	0.0401
	(0.0300)	(0.0602)	(0.0551)	(0.0184)	(0.0609)	(0.0625)	(0.395)	(0.0385)
rural_sdrought	-0.0585**	-0.129**	-0.0575	0.00789	0.141***	0.111**	-0.485	-0.0325
	(0.0227)	(0.0539)	(0.0482)	(0.00992)	(0.0484)	(0.0534)	(0.301)	(0.0308)
conflict_rural	-0.0780**	0.0519	0.0181	0.00315	-0.0350	-0.146*	1.267***	0.0566
	(0.0370)	(0.0661)	(0.0654)	(0.00961)	(0.0508)	(0.0759)	(0.352)	(0.0529)
conflict_urban	-0.0292	0.174***	-0.124*	-0.0116	0.0319	0.0448	0.940*	-0.0166
	(0.0412)	(0.0516)	(0.0709)	(0.0198)	(0.0737)	(0.0770)	(0.517)	(0.0323)

Table 6. Regression Results – full model; logged # of fatalities within 15km

VARIABLES	(1) sick_30d	(2) med_30d	(3) attend_pct	(4) lnincpc	(5) lnexp	(6) lnfoodexp	(7) fies	(8) food_security
death_hh_rural	0.0628*** (0.0212)	0.0140 (0.0290)	-0.0179 (0.0281)	-0.00729 (0.00444)	0.0142 (0.0270)	0.0302 (0.0314)	0.563*** (0.205)	-0.0345 (0.0260)
death_hh_urban	-0.00399 (0.0291)	-0.0632 (0.0474)	-0.00899 (0.0419)	0.00535 (0.0182)	-0.0786 (0.0618)	-0.125* (0.0706)	0.108 (0.274)	0.0545 (0.0399)
drought_rural	-0.00627 (0.0114)	0.0255 (0.0176)	0.0149 (0.0162)	-0.00806** (0.00361)	-0.0900*** (0.0176)	-0.0950*** (0.0211)	0.714*** (0.106)	0.0550*** (0.0163)
drought_urban	-0.0746* (0.0420)	-0.000837 (0.0696)	0.138*** (0.0527)	-0.0172 (0.0258)	-0.253*** (0.0663)	-0.221** (0.0858)	0.663 (0.511)	0.0759 (0.0520)
urban_lf15	-0.00488 (0.0128)	0.0105 (0.0177)	-0.00683 (0.0163)	-0.0101 (0.00711)	-0.0208 (0.0170)	-0.0257 (0.0198)	0.181 (0.121)	-0.00160 (0.00922)
rural_lf15	-0.0260*** (0.00779)	-0.0251** (0.0122)	-0.0194* (0.0111)	-0.00162 (0.00208)	0.00618 (0.0116)	-0.00455 (0.0137)	-0.00502 (0.0722)	-0.0229** (0.0103)

Table 7. Regression Results - full model; logged # of fatalities within 20km

VARIABLES	(9) sick_30d	(10) med_30d	(11) attend_pct	(12) lnincpc	(13) lnexp	(14) lnfoodexp	(15) fies	(16) food_security
death_hh_rural	0.0625*** (0.0212)	0.0143 (0.0290)	-0.0182 (0.0281)	-0.00718 (0.00444)	0.0143 (0.0270)	0.0299 (0.0314)	0.563*** (0.205)	-0.0347 (0.0261)
death_hh_urban	-0.00423 (0.0291)	-0.0628 (0.0474)	-0.00924 (0.0420)	0.00520 (0.0182)	-0.0789 (0.0618)	-0.125* (0.0705)	0.111 (0.274)	0.0544 (0.0399)
drought_rural	-0.00651 (0.0114)	0.0251 (0.0176)	0.0148 (0.0162)	-0.00812** (0.00362)	-0.0899*** (0.0176)	-0.0950*** (0.0211)	0.714*** (0.106)	0.0548*** (0.0163)
drought_urban	-0.0752* (0.0421)	-0.000409 (0.0696)	0.137*** (0.0527)	-0.0174 (0.0258)	-0.253*** (0.0663)	-0.221** (0.0858)	0.665 (0.511)	0.0757 (0.0520)
urban_lf20	-0.00887 (0.0129)	0.0151 (0.0178)	-0.00568 (0.0163)	-0.0120* (0.00720)	-0.0207 (0.0170)	-0.0249 (0.0198)	0.185 (0.121)	-0.00302 (0.00919)
rural_lf20	-0.0268*** (0.00763)	-0.0206* (0.0120)	-0.0214** (0.0109)	-0.000788 (0.00205)	0.00656 (0.0115)	-0.00586 (0.0135)	-0.000706 (0.0711)	-0.0224** (0.0101)

Table 8. Regression Results - full model; logged # of fatalities within 25km

VARIABLES	(17) sick_30d	(18) med_30d	(19) attend_pct	(20) lnincpc	(21) lnexp	(22) lnfoodexp	(23) fies	(24) food_security
death_hh_rural	0.0627***	0.0146	-0.0183	-0.00712	0.0140	0.0300	0.563***	-0.0343
	(0.0212)	(0.0290)	(0.0281)	(0.00446)	(0.0270)	(0.0314)	(0.205)	(0.0260)
death_hh_urban	-0.00552	-0.0622	-0.0104	0.00552	-0.0800	-0.126*	0.120	0.0543
	(0.0291)	(0.0474)	(0.0419)	(0.0181)	(0.0617)	(0.0703)	(0.273)	(0.0398)
drought_rural	-0.00679	0.0249	0.0147	-0.00812**	-0.0898***	-0.0950***	0.714***	0.0545***
	(0.0114)	(0.0176)	(0.0162)	(0.00363)	(0.0176)	(0.0211)	(0.106)	(0.0163)
drought_urban	-0.0762*	8.90e-05	0.137***	-0.0155	-0.253***	-0.220**	0.666	0.0764
	(0.0422)	(0.0696)	(0.0529)	(0.0256)	(0.0663)	(0.0857)	(0.511)	(0.0520)
urban_lf25	-0.0216*	0.0144	-0.0160	0.00531	-0.0199	-0.0197	0.184	-0.00129
	(0.0127)	(0.0176)	(0.0161)	(0.00656)	(0.0165)	(0.0193)	(0.119)	(0.00894)
rural_lf25	-0.0266***	-0.0188	-0.0238**	0.000213	0.00479	-0.00514	-0.000816	-0.0200**
	(0.00733)	(0.0117)	(0.0105)	(0.00199)	(0.0110)	(0.0130)	(0.0690)	(0.00987)

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